JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE

VOL. LV
1969

Journal

of the

Royal Naval Medical Service

Journal
of the
Royal Naval Medical Service

VOL. LIV
1968

No. 1 Spring 1968 Vol. LIV

Journal
of the
Royal Naval Medical Service

PUBLISHED THREE TIMES A YEAR

(The Medical Director General (Navy) is not responsible either for the opinions expressed in this Journal)

Editorial

JACKIE COULTER

It is with profound regret that we record in this number the death of Surgeon Captain J L S Coulter DSC FRCS(Eng) LRCP RN (Retired) Barrister-at-Law By recording this obituary notice in the Editorial we pay tribute to a former Editor of the Journal who from 1958 to 1961 managed its affairs with skill and devotion

Jackie Coulter was one of the outstanding personalities of the Medical Branch whose name is assured of an honoured place in Medical History as co-author with Christopher Lloyd of Volumes III and IV of *Medicine and the Navy*

Not only was he a brilliantly accomplished writer but as an after dinner speaker he was second to none As an administrator he was fearless and forthright completely confident and at all times proud of the Service to which he gave unselfishly the best years of his life. Most of all however he was appreciated for his quite outrageous sense of fun his frank anecdotes his generosity and his knowledge of horse and dog racing He set an example to all those who knew him of elegance impishness integrity and achievement St Paul recommended that man should live abundantly — Jackie Coulter certainly followed his advice

Following his retirement from the Navy in 1961 he joined Armour Pharmaceuticals and we watched his progress with affectionate interest We were distressed to hear of the illness which led to his retreat to Ascension Island Unfortunately following a letter from him in June 1966 (Editorial Vol LII p 54) we lost track of him until we saw the announcement of his death

Our deepest sympathy goes to his wife Frances in her great loss

THE PSYCHIATRISTS DILEMMA

In recent issues of the Journal a number of articles have underlined a dilemma which is today causing Naval psychiatrists considerable anxiety Surgeon Captain Wallis's forthright paper in this issue further underlines the problem

Survey Boards in the hospitals are frequently asked to invalid a man for psychiatric illness for which stress of Service life is frequently a pre-disposing factor They present themselves to the Board as apparently fit young men likely to remain so in civilian life In these days of manpower shortage it would be of advantage if these patients could be rehabilitated and returned to duty The adverse effect which this could have on the morale of the ship's company especially in small ships has been pointed out and the present system certainly seems to be a policy of cutting losses as far as the Service is concerned It must however be very disheartening to the psychiatrist to lose his cases in this way without having a real opportunity to effect a permanent cure

Psychiatrists themselves seem divided between acceptance and rejection treatment and it is quite obvious that a very real problem exists today Acceptance

leads to invaliding and reject[illegible]
In medicine there can only be [illegible]
lies the challenge to the psychiatrist

SIR FRANCIS CHICHESTER

We had hoped to publish a medical [illegible] Chichester who was a patient in R N [illegible] Francis and Lady Chichester have however [illegible] consider Sir Francis's medical history to be a [illegible] not wish to be divulged to our readers We must [illegible]

ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION AT EASTBOURNE JUNE 24 28 1968

The Naval Luncheon will take place on Tuesday June 25 Full particulars will be given in the British Medical Journal six to eight weeks in advance and all serving and past members of the Royal Naval Medical and Reserve Services are eligible to attend It is hoped that many will do so

Articles

THE BENDS: CURRENT CONCEPTS IN THE TREATMENT OF DECOMPRESSION SICKNESS*

By David H. Elliott

Necrosis of juxta-articular bone in compressed-air workers is the condition already familiar to orthopaedic surgeons and recently discussed by your President Elect Professor R. Barnes and others in the Journal of Bone and Joint Surgery (McCallum and Walder 1966). Your President Mr. Jackson Burrows has invited me to present an outline of decompression sickness in its acute stages since this frequently precedes the bony lesions.

The bends is an occupational disease which is always preceded by a reduction of environmental pressure. Aviators form one occupation which is at risk but their bends occur at the low pressures of high altitude and are, as a general rule, cured by returning to sea-level. Thus aviator's bends rarely present as a clinical problem outside the Armed Forces. Compressed air workers and divers in the sea, on the other hand, are exposed to very high environmental pressures and their bends appear on returning to atmospheric pressure at the surface. Such decompression sickness is quite common and is by no means confined to members of the Armed Forces. The compressed air workers are those who work in a high pressure environment without being immersed in water and include many in this country who are employed building tunnels, for instance under Southampton Water, in caissons for building bridges and piers and even, though at minimal risk, surgeons and their teams who work in hyperbaric operating theatres. The divers at risk are not only the professionals, those in the Royal Navy and those who work on drilling rigs in the North Sea, but also lobster fishermen and amateur sports divers in shallower coastal waters. Such diving is not confined to the sea and serious decompression accidents occurred recently in a lake as far inland as Leicester and down a well in Aldershot.

Pain in a large joint is the most common manifestation of acute decompression sickness. These pains were first described in 1845 by Triger and later Pol and Watelle (1854) noted that they were cured by returning to the pressure at which they had been working. It was suggested that the pain on decompression was due to bubbles formed in the body from the gases which had dissolved in the tissue fluids during the exposure to raised pressure. This hypothesis is still valid today.

One hundred years ago diving helmets were being used by the sponge fishermen of the Greek Archipelago. Dr. Gal, who had been with the sponge fishers in 1869 (Gal, 1872), described a relationship between the rapid onset of pain in the left shoulder and a history of hard work with that arm. He also described one man in whom paraplegia began twenty four hours after surfacing but which steadily

*Paper read at the Spring Meeting of the British Orthopaedic Association held at the Royal Naval Hospital, Haslar, on 15th April 1967, and published in brief form in The Journal of Bone and Joint Surgery, 49B: 588–591, 1967.

regressed until two weeks later he had fully recovered In the following season Leroy de Mericourt (1869) reported ten deaths in 24 divers working deeper than 45 m (150 feet) In a second group diving at depths less than 35 m (115 feet) and ascending cautiously taking about thirty five minutes there were no fatalities Later still working at these depths when the Greek sponge divers shortened their ascents to less than two minutes symptoms reappeared and five out of three hundred died

AETIOLOGY AND PATHOLOGY

Although the uptake of inert gas by the body is fairly well understood no details are known of the dynamic processes the formation of bubbles, whether they are in the tissues or the blood, or their subsequent behaviour and elimination The strongest evidence in favour of bubbles is their response to treatment by the reapplication of pressure More needs to be known of the pathology of bubbles *in vivo* if there is to be any advance in the prevention and treatment of decompression sickness and in particular of its bony lesions Aseptic necrosis of bone is the delayed form of decompression sickness causing arthritic symptoms months after the causative hypothetical bubbles Sarcomitous change in one such lesion has been reported (Dorfman *et al* 1966) Bone necrosis has been shown to be more common in those compressed air workers who have been treated for joint bends (McCallum and Walder 1966) The incidence of bone damage in divers is not known and although it is thought not to exist in the Royal Navy the recent findings of radiological lesions in 100 per cent of some groups of Japanese divers (Ohta 1967), has stressed the urgency of the current survey of professional divers

Years of experience and research have led to the relative safety of present-day decompression schedules which determine the rate at which one may return safely to atmospheric pressure By their use bends at tunnel workings have been reduced to a crude incidence of less than one per cent of all decompressions but even this figure still means a number of cases every week and that sooner or later the majority of workers have a bend

The current tables for divers might appear to be much safer than those for compressed air workers because the time allowed in the water is severely limited and the rates of decompression are much slower Although bends are virtually unknown to those divers who adhere to the compressed air tables the apparent prolongation of decompression is not the provision of a larger safety margin because for some unknown reason men find hazardous in the sea schedules which men in compressed air can tolerate with safety Unfortunately some divers consider these decompression stoppages to be a waste of valuable time underwater and ignore the safety they offer The random nature of decompression sickness is such that these persons may surface on many occasions without trouble until one day full of self confidence following a similar dive they develop decompression sickness

For the growing number of divers who need to go deeper than about 75 m (250 feet) breathing mixtures of oxygen and helium decompression is never free from hazard In 1965 when after months of trials in dry compression chambers

the d[illegible] of the Royal Navy made 26 successful dives for up to one hour at depths between 137 and 183 m (450 and 600 feet) the incidence of bends was more than 30 per cent

When the diver arrives at the surface he appears to be perfectly well Most symptoms begin within the first hour but some may be delayed for as long as twenty-four hours With severe exposures to pressure the latent period becomes shorter until during deep sea diving on oxy-helium symptoms may arise during the decompression while the diver is still at raised environmental pressure Whether it occurs at the surface or during the decompression the pain may arise in one of two characteristic ways it may occur suddenly during or immediately after a drop in pressure and this may be related to a painful expansion in accordance with Boyle s law of a previously silent bubble or more commonly the pain begins gradually after a latent period at the stoppage and this may be associated with an expansion of the bubble by the continued diffusion into it of gas from the surrounding tissues

The most commonly affected joint in divers breathing compressed air is the shoulder, but persons who spend a much longer time under pressure deep sea divers breathing oxy-helium and compressed air workers tend to have bends more frequently in the knee The pain is usually a diffuse ache centred over a large joint but seeming to radiate up and down the limb Occasionally a diver may describe the site with precision commonly the insertion of ligamentum patellae Usually there are no abnormal physical signs to be elicited

There are other manifestations which if present do not require treatment but which tend to confirm the diagnosis for instance a marbled blotchy rash on the trunk which is considered to be due to vascular stasis and itching

Of those patients presenting with pain in a joint as many as one third may have other more serious symptoms The possible manifestations are many and are determined by the site of the hypothetical bubbles One is due to derangement of labyrinthine function with vertigo nystagmus nausea and vomiting sometimes associated with tinnitus and partial deafness Cerebral damage may account for almost any bizarre symptom or behaviour but more commonly visual blurring scotomata hemianopia fortification spectra or migrainous headaches The most sinister development in a patient presenting with joint pain is the insidious onset of paraesthesiae perhaps over the joint and later of muscular weakness in that limb In less than half an hour the untreated patient may have become a paraplegic In a few persons these severe forms of decompression sickness are the presenting symptoms and there is no joint pain Also commonly without concurrent joint pain is the respiratory type of decompression sickness chokes Shock may complicate the later stages of severe decompression sickness when hypovolaemia follows loss of protein through damaged capillaries throughout the body

Aseptic bone necrosis the delayed form of decompression sickness may be first detected radiologically while still symptom free but it is still not unusual for it to be diagnosed following the sudden collapse of the juxta articular bone during a strenuous movement

DIAGNOSIS

The diagnosis of acute decompression sickness is usually obvious but doubt may occur in minor cases who have had a nominally safe decompression Such doubt could delay treatment and allow time for the development of complications Thus the rapid response of the doubtful case to recompression is not only diagnostic but is also wise clinical management

TREATMENT

Treatment by immediate recompression reduces the size of the hypothetical bubble and when the patient has been restored to full fitness a relatively slow return to atmospheric pressure allows time for adequate elimination of the excess inert gas The only exception to this is the treatment of aseptic necrosis of bone The treatment of the juxta articular lesion is orthopaedic and the relative merits of autogenous bone grafts to stimulate repair arthrodesis and the insertion of metallic prostheses have been discussed recently by members of the Medical Research Council Decompression Sickness Panel (McCallum and Walder 1966)

Recompression of a patient with decompression sickness can restore him to full fitness within minutes The amount of recompression required is determined by the response to treatment and it has been found that the depth of relief of symptoms may occasionally be greater than the depth of the previous dive The times and depths to be followed in such therapies are based on the U S Navy s treatment tables (Van der Aue *et al* 1945) If joint pain is the only symptom and has been relieved by 66 feet U S N Treatment Table 1 may be followed during which air is breathed from 100 feet to 60 feet and then 100 per cent oxygen to the surface (Figure 1) The Royal Navy has adopted the alternative Air Table This more prolonged decompression is of value in itself and the table surfacing from 40 feet in five minutes may be considered even on oxygen unnecessarily brusque A more recent regime (Goodman and Workman 1965) uses pure oxygen at a maximum depth 60 feet This is a successful therapeutic schedule and its depth time course should be compared with that for a compressed air worker whose bend is also relieved at 60 feet (Golding *et al* 1960) a successful schedule in which oxygen is not used

If the pain in the joint is not relieved till a pressure greater than 66 feet of sea water the diver is recompressed to 165 feet and a longer table (U S N Table II IIA or R N 5B) is used

The more serious symptoms require more rigorous therapy Tunnel workers are treated at a pressure slightly greater than the depth of their relief from symptoms and a linear rate of decompression is used (Figure 2) For divers 165 feet is again the recommended depth of recompression but an even slower ascent is given The milder cases are treated on Table 5C and the more difficult cases who may need to spend up to two hours at 165 feet on Table 5D The minimal decompression technique (Goodman and Workman 1965) intermittent oxygen for an hour at 60 feet and during three hours decompression, has proved successful for some neurological cases but further clinical assessment is still required We would not expect it to cure bends following very deep oxy helium dives since even

[illegible]

Figure [illegible]

the standard treatment tables are not sufficient. It may, however, prove to be the right treatment for intractable decompression sickness following shallower multiple compressed air dives.

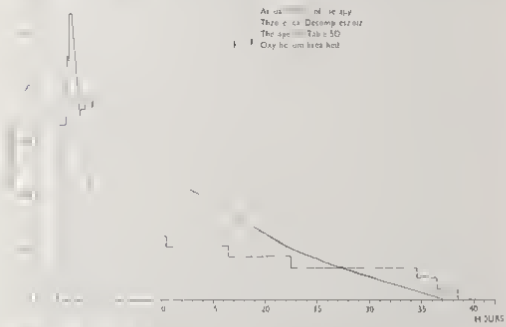
After a deep dive the depth of relief of symptoms may be deeper than the standard therapeutic depth, 165 feet, but there are only a few compression chambers that will exceed about 230 feet. Royal Naval divers have needed to be recompressed on oxy-helium to much greater depths than that and therefore deep sea diving can be done only where there are suitable chambers. In cases in which treatment begins even before the diver has reached the surface, recompression is taken to the depth of complete relief of symptoms. There is then a twenty to thirty minute stay at that pressure before a slow decompression. Decompression sickness in one patient was not cured until he had been lowered in a submersible chamber to 450 feet in the open sea (Figure 3).

A member of a Royal Naval deep sea diving team, aged 25, dived on 26th May, 1965, in a submersible chamber to 600 ft. (183m.) for 60 minutes' breathing a mixture of five per cent oxygen and 95 per cent helium. Four 20 minutes he swam and worked outside the chamber. Initial decompression was carried out in the submerged chamber and then he was transferred under pressure to a dry chamber on board ship. At 230 ft. after four hours decompression on the experimental schedule, he noticed the onset of dizziness and, on standing, a tendency to fall over. He described vertigo to one direction on standing and to the other direction when lying. He had nausea and also some deafness on the left. He appeared sallow, was sweating and had nystagmus towards the left. He was immediately recompressed to 300 ft., the maximum depth of the ship's chamber, but there was no significant improvement. The only way to increase his ambient pressure was to return him and his no-diver to the submersible chamber. This transfer took a further 15 minutes, during which there was still no improvement in his condition. The submersible chamber was then lowered in the sea to 455 ft., where the patient had a sudden and complain relief of all his symptoms. The subsequent therapeutic decompression, though experimental, was, apart from a joint bend in the no-diver, slow and uneventful.

The subsequent decompression is at a rate determined by the condition of the patient and, after the experience of 30 such cases, we found that most could return safely to the surface if an exponential curve was followed. This exponential has a half-time of about 13 hours and corresponds to a drop of absolute pressure in the ratio 1.3 to 1 over a period of five hours (Barnard, 1967). Thus this curve entered at any depth after the relief of symptoms provides a guide to the therapeutic decompression of all cases of decompression sickness occurring on oxy-helium at great depths. Its time course following recompression of a diver to the depth of his original dive, 270 feet (82.3 m.), may be compared with that of Table 5D (Figure 4), but it needs to be emphasised this curve is for oxy-helium diving and that a larger time constant may be needed for such a curve using only air.

Thus with recompression the acute forms of decompression sickness can be cured but later bone damage may not necessarily have been prevented. The biggest problem which remains is undoubtedly aseptic necrosis of bone. Early detection by radiological survey is important but the outstanding research project in the field of decompression sickness is to find some means of preventing these chronic lesions during or soon after the original and presumably inadequate decompression. For this it may be necessary to search ultrasonically for the presence of the silent bubbles in bone, but techniques have not yet been perfected and, for the moment, we can do no more than ensure adequate treatment in the acute stages.

[illegible] *of a diver with the symptoms of labyrinthine damage who had been at 770 [illegible] and at 450 feet in the sea. The stepped interrupted line represents decompression according to R.N. Table 50 and the uninterrupted curve is the exponential e—0.053t which substituted in standard diving tables has been designated as a guide for the decompression of [illegible] rate.* (Reproduced by permission of the Editors Journal of Bone and Joint Surgery)



[illegible] *of a diver whose joint and neurological symptoms were not fully [illegible] 165 feet following an oxy helium dive to 770 feet*

REFERENCES

Barnard E E P and Elliott D H (1966) *Brit Med J* **2** 809

Barnard E E P (1967) Proceedings of Third Symposium of Underwater Physiology Ed Lambertsen C J (U S A Williams and Wilkins Baltimore) (U K E & S Livingstone Edinburgh & London) p 156 164

Doreman H D Norman A and Wolff H (1966) *J Bone Jt Surg* **A-48** 978

Gal A (1872) *Des dangers du travail dans l'air comprimé et des moyens de les prevenir* Thèse de Montpellier

Golding C F Griffiths F Paton W D M Walder D N and Hemileman H V (1960) *Brit J indust Med* **17** 167 181

Goodman M W and Workman R D (1965) Manual recompression Oxygen-breathing approach to treatment of decompression sickness in divers and aviators U S Navy Experimental Diving Unit Research Report No 5 65

Leroy de Méricourt M (1869) *Ann Hyg publ* (Paris) (2e ser) **31** 247

Mccallum R I and Walder D N (1966) *J Bone Jt Surg* **B-48** 707

Otta Y (1967) Personal communication

Pol A and Watelle T J J (1954) *Ann Hyg publ* (Paris) (2e ser) 1 741

Triger (1845) *Ann Hyg publ* (Paris) **33** 463

Van der Aue O E White W A Hayter R Brinton E S Kellar R J and Behnke, A R (1945) Physiologic factors underlying the prevention and treatment of decompression sickness U S Navy Experimental Diving Unit Research Project X-433 Report No 1

THE HEALTH OF THE NAVY IN THE POST-WAR YEARS

By Frank Pollard Ellis

A report on the health of the Navy for the years 1957 1963 which incorporates the trends for 1953 1956 has been completed recently The last Report to be published by H M Stationery Office was for the year 1936 Surgeon Vice-Admiral Sir Derek Steele Perkins when he was the Medical Director-General (Naval) considered it would be timely therefore to summarise the evidence thus made available concerning the causes of sickness and injuries invaliding and deaths in the post war years

Prior to the Second World War Naval Health Reports were prepared from the nosological tables of the medical journals prepared by the senior medical officers of ships hospitals or shore establishments The first Report for the years 1830 1836 was published in 1840 following several powerful Editorials in the *Lancet* which suggest that the need was more pressing in the first half of the 19th century than it appears to be today Thus in the issue for 26th July 1838 we read

> no public document of any statistical value ever emanated from the Medical Department of the Navy What have the 1000 Navy Surgeons paid £130,000 a year of the public money done? demand the economists Have they raised the Health of the Navy to the highest attainable pitch We answer yes but they have not established the fact by accurate observations rigorously recorded Have they contributed to the progress of the science which they cultivate? We answer yes again but they have never laid the evidence before Parliament or before the public It is with unfeigned pleasure then we have lately heard that a complete digest of the observations in the Nosological Returns is preparing for publication which will give the world no longer in the dark respecting the services that the medical department of the Navy has rendered to science and society

Dr John Wilson who wrote the 1830 1836 Report at the behest of Sir William Burnett F R S the Physician General of the Navy was also critical of earlier accounts commenting that before 1822 the returns from ships 'were so defective and loose as to be of little value for statistical purposes Statistical Reports were published subsequently without interruption until 1936 except for the years 1844 1855 and 1916 1921 Publication was then suspended The void thus created has been filled partially by the publication elsewhere of a summary of the principal causes of sickness and injuries and of invaliding and deaths for the years of the Second World War (Ellis and Rowlands, 1966) derived from tables constructed according to the format of the pre war Reports The complete tables will be included eventually in the Naval Chapter of the Statistical Volume of the Official History of the Second World War together with a detailed analysis of the causes of invaliding and deaths due to disease for the years 1934 1943 (Roberts 1944) There were no Reports during the period 1946 1952

ROYAL NAVY AND ROYAL MARINES 1953 1963

The techniques employed to examine the statistics of any community may be sophisticated but the end results will only be as accurate as the raw material which is analysed Since 1951 when a common system of medical documentation was

accepted by the three Services this material has been derived in the Royal N... from the Individual Case Records (the Services Form — F Med 14) which are completed when any man or woman of the Armed Forces is on the Sick List for more than 48 hours.* The nomenclature of the World Health Organisation's International Statistical Classification of Diseases Injuries and Causes of Death 1955 (Geneva 1957) is used by each of the Services in constructing the tables. In the current Naval Reports the Intermediate List A of 150 causes of morbidity and mortality and List C — a special list of only 50 causes — are generally used for the analysis of the case returns and reference is made only occasionally to the more detailed Tabular List and the 4-digit sub-categories of disease which are however available on punched cards for research or administrative purposes from the year 1958 onwards. A Joint Services Code was used in the analysis of injuries before 1962 when the Joint Armed Forces Statistical Classification of Causes of Injury a supplement to the International Classification was adopted.

The Reports for 1953–1963 show for the first time the causes of sickness for officers and ratings separately and include the figures for the Women's Royal Naval Services (the Women's Royal Naval Service and (after 1960) the Queen Alexandra's Royal Naval Nursing Service).

TABLE 1
Royal Navy and Royal Marines. Total cases, morbidity, invaliding and deaths

Year	Average strength	Fresh cases (No.)	No. of fresh cases per 1 000	Days sickness per head	No. sick daily per 1 000	Invaliding per 1 000	Deaths per 1 000
1953	138 940	52 481	378	5·7	15·6	18·7	1·7
1954	128 580	42 557	331	4·9	13·4	15·2	1·2
1955	123 140	42 147	342	5·3	14·5	13·4	1·5
1956	117 320	37 729	322	5·0	13·8	10·8	1·3
1957	111 000	47 753	430	5·1	14·0	11·0	1·6
1958	103 890	39 528	316	4·3	11·9	9·5	1·3
1959	97 510	34 922	358	4·6	12·6	9·8	1·1
1960	93 890	30 873	329	4·7	11·5	10·6	1·9
1961	91 950	31 124	338	4·4	12·0	11·1	1·2
1962	91 230	29 736	326	4·2	11·6	10·8	1·3
1963	92 705	30 296	327	4·3	11·7	10·9	1·1

General trends

Table 1 indicates that as a whole the Royal Navy and Royal Marines became more healthy during this period. There was a downward trend in the numbers of cases, the days sickness per head and the numbers sick daily. The death rate fluctuated between 1 and 2 per 1 000. The final invaliding rate after a notable improvement between 1953 and 1956 to which too much significance should not be attached as it was in part due to a tightening up of medical regulations to exclude the acceptance of recruits who were below standard, remained at a constant level.

*There are exceptions. Naval regulations require that cases of venereal disease or non specific urethritis which are treated on the attending list only are to be shown as 0 days of sickness. All invaliding and deaths are included, although they may not previously have been on the sick list.

Differences with station The case rates in Table 2 suggest that the Far East Station was the least healthy of the larger stations (but see comments on Table 9) the Mediterranean the most healthy and the Home Shore Establishments and the Home Fleet lay between these two in this respect

TABLE 2

Total cases on different stations. Rates per 1 000

Year	Home Shore Estabs	Home Fleet	Mediterranean	American and W Indies	South Atlantic	East Indies[1]	Far East	Total Force
1953	419	299	297	334	(477)[2]	778	588	378
1954	361	253	268	328	431	397	613	331
1955	380	283	251	220	160	423	607	342
1956	325	263	262	379	156	559	761	322
1957	435	409	367	(159)	(706)	396	653	430
1958	388	363	255	(156)	(100)	196	685	316
1959	324	422	246	(205)	141	(414)	659	358
1960	287	365	275	(279)	(301)	306	582	329
1961	335	373	239	(207)	(743)	334	648	338
1962	313	359	176	(326)	(367)	172	460	326
1963	311	379	192	123	247	268	427	327

[1]Prior to September 1958 the East Indies Command included Ceylon After this date Ceylon was included in the Far East Command and the remainder of the Command was known as the Arabian Sea and Persian Gulf Station until 1st May 1961 when it was re-named the Middle East Station

[2]Where the population exposed to risk is less than 1 000 rates are given in brackets

Officer—rating differences In this paper ratings will generally include both naval ratings and Royal Marine other ranks unless it is stated otherwise For each of these years the crude case rates for all diseases and injuries for ratings were greatly in excess of the crude rates for officers Adjusting the rates for differences in age distribution (the officers were older on the average) reduced these differences but it did not eliminate them

The main disorders which contributed to the relatively high rate for ratings were gonococcal infections (C4 in the International List) acute pharyngitis and tonsillitis (C29) influenza (C30) diseases of the stomach and duodenum (C35) diarrhoea and enteritis (C38) other specific and ill-defined diseases (C49) and accidents poisonings and violence (C50) They were most frequent in men under 30 years of age

Age The highest total incidence of sickness occurred in the under 20 years group the next highest in the 20 24 years group and the next in the 25 29 years group The incidence in the older groups was similar

Occupation The incidence of fresh cases due to all causes was highest in the Seamen Communications and Engine Room Groups There was not a great deal of difference between the Royal Marines and the Stek Berth and Supply Groups The Electrical the Radio Electrical and the Air Maintenance Fitting Artificer and Artisan groups were the most healthy ratings whilst by this standard the officers were the healthiest group of all

Causes of Sickness

Throughout the period the main groups of diseases causing sickness with the exception of the venereal diseases — a major cause for ratings but rare among officers — and two omnibus categories all other diseases classified as infective and parasitic (A43)* and ill-defined and unknown causes of morbidity and mortality (A137) were acute upper respiratory tract infections influenza and gastro enteritis and colitis (Table 2)

TABLE 3

Main causes of ill health Rates per 1 0000

Year	Acute upper respiratory infections (A87)		Influenza (A88)		Gastro-enteritis and colitis (A104)	
	Officers	Ratings	Officers	Ratings	Officers	Ratings
1953	37 4	85 8	18 3	24 8	9 0	15 8
1954	29 4	66 3	4 7	10 7	7 8	13 7
1955	32 8	74 9	8 4	22 6	8 3	14 0
1956	27 7	67 8	6 3	13 2	8 0	15 5
1957	22 6	54 4	53 4	150 5	4 3	13 0
1958	23 7	66 6	7 4	24 1	5 6	16 1
1959	27 0	75 8	17 6	51 1	6 9	17 9
1960	22 5	63 6	5 9	13 1	7 3	21 8
1961	27 4	68 7	14 6	28 0	5 6	19 7
1962	23 2	78 5	7 4	19 6	5 9	18 0
1963	29 4	68 8	11 4	23 3	6 0	20 1

The most notable improvement was a five-fold reduction in the case rate for pulmonary tuberculosis (Table 4) The Registrar General's Statistical Report for 1962 shows the notification rate for male cases of pulmonary tuberculosis in England and Wales to have fallen from 1 1 per 1 000 in 1953 to 0 5 in 1962 a two fold improvement. In 1963 the incidence in England and Wales for men in similar age groups to men in the Navy (15 44 years) was also 0 5 per 1 000

TABLE 4

Pulmonary tuberculosis. Cases. Crude rates per 1 000

Year	Officers	(Average strength)	Ratings	(Average strength)
1953	1 3	(14 780)	2 5	(174 160)
1954	0 9	(14 760)	1 0	(113 820)
1955	1 1	(14 270)	1 5	(108 870)
1956	0 5	(13 820)	1 6	(103 500)
1957	1 0	(13 380)	1 6	197 620)
1958	0 7	(12 260)	1 1	190 630)
1959	0 8	(11 760)	0 8	186 250)
1960	0 7	(10 890)	0 8	183 000)
1961	0 3	(10 730)	0 6	181 000)
1962	0 3	(10 675)	0 7	180 555)
1963	0 3	(10 840)	0 5	(81 865)

*A43 Includes 33 infections and such common disorders as rubella (Tabular List No 086) ch ckenpox (187) mumps (089) dermatophytosis (131) scabies (135) and ped culosis (136)

The figures for rating recruits were even more impressive In 1953 there were 44 cases (3 3/1,000) in men who had been in the Navy less than 12 months In 1963 there was only one case in this group of ratings

TABLE 5
Arteriosclerotic and degenerative heart disease Total Force Rates per 1 000

Year	Officers		Ratings		
	Cases	Rate	Age standardised rate	Crude rate	Cases
1953	7	0 5	0 6	0 1	18
1954	10	0 7	1 4	0 2	23
1955	7	0 5	1 0	0 2	25
1956	11	0 8	1 0	0 7	24
1957	6	0 4	0 6	0 1	17
1958	9	0 7	0 9	0 3	23
1959	9	0 8	1 5	0 3	22
1960	9	0 8	2 9	0 6	50
1961	7	0 7	2 3	0 4	34
1962	10	0 9	1 3	0 2	20
1963	9	0 8	1 5	0 3	23

The importance of adjusting the rates for differences in age distribution when comparing officers with ratings was demonstrated by the case rates for arteriosclerotic and degenerative heart disease — largely coronary disease — and hypertensive disease (Table 5) Each year the crude rates for ratings in both these groups were less than the crude rates for officers Age standardisation not only reduced this difference but for arteriosclerotic and degenerative heart disease the age standardised rate for ratings was greater than the crude rate for officers every year In 1957 1960 1961 1962 and 1963 this was also true for hypertensive disease The impression given by the crude rates that these diseases were more prominent in the officer population was quite misleading if anything the reverse was the case

The upward trend in the case rate for carcinoma of the respiratory system (A50) which has been reported in the civilian community was not reflected in these naval figures The case numbers for officers varied from 1 to 2 each year and for ratings from 1 to 6 each year However as the Registrar General's Statistical Reports reveal that the upward swing in the incidence of lung cancer only becomes apparent about the fifth decade these figures do not detract from the view that the heavy smoking habits of some men probably exact their toll in terms of respiratory and cardiac disease after they have retired from the Service

TABLE 6
Prominent causes of morbidity Ratings Cases.
Averaged rates per 1 000

	1953 54	1955 57	1958-60	1961 63
Psychoneuroses and neuroses (C19)	5 2	5 4	5 0	6.4
Duodenal ulcer (A100)	3 7	3 0	2 6	3 0
Gastritis and duodenitis (A101)	6 9	6 6	6 2	5 3
Bronchitis chronic and unqualified (A93)	4 3	4 6	4 8	5 0
Boils abscess cellulitis and other skin infections (C44)	13 8	11 3	7 8	8 0
Other diseases of skin (C45)	8 6	7 5	5 7	7 4

The averaged annual case rates for certain prominent causes of sickness of ratings are summarised in Table 6 Psychoneuroses and the neuroses were not only an important cause of morbidity but also of invaliding for officers and for ratings The case rate was rising towards the end of this period and so was the invaliding rate Disorders of the digestive system particularly duodenal ulcer and gastritis and duodenitis also continued to account for much sickness There was no improvement in the incidence of chronic bronchitis The combined rates for bacterial and other skin diseases (C44 and C45) were reduced from over 22 per 1 000 at the beginning of the period to just over 15 per 1 000 at the end but skin diseases still accounted for a great deal of sickness and these groups do not include such conditions as athlete s foot (dermatophytosis) scabies pediculosis and rashes or skin eruptions not otherwise specified In assessing the impact of these diseases on the efficiency of the Navy it is important to remember that the numbers of cases who were on the Sick List for less than 48 hours and all Attending List cases are excluded from these Reports

TABLE 7
Asthma and epilepsy Ratings Cases
Averaged rates per 1 000

	1953 54	1955 57	1958 60	1961 63
Epilepsy (A73)	0 6	0 7	0 5	0 4
Asthma (D L 241)	—**	1 2	1.2	1 1

**No record in abstracts available

The averaged annual rates for ratings are shown in Table 7 for two diseases epilepsy and asthma which loom larger in hospital practice than in general practice They both frequently pose difficult problems in disposal and may cause much unnecessary stress for the patients once they are allowed to join the Service This focuses attention on the need for careful consideration at pre entry medical examinations and examinations after entry of individuals with a history of fits or attacks of loss of consciousness or of recurring respiratory or allergic illness The rates for officers were nearly always much lower

TABLE 8
Certain infectious diseases of note Total Force.. Cases
(Rates per 1 000)

Year	Acute poliomyelitis	Glandular fever	Infective hepatitis
1953	24 (0 2)	218 (1 6)	327 (2.4)
1954	19 (0 2)	204 (1 6)	329 (2 6)
1955	12 (0 1)	227 (1 8)	315 (2 6)
1956	9 (0 1)	241 (2 1)	284 (2.4)
1957	11 (0 1)	218 (2 0)	155 (1 4)
1958	6 (0 1)	152 (1 5)	136 (1 3)
1959	5 (0 1)	140 (1 4)	145 (1 5)
1960	3 (0 0)	103 (1 1)	163 (1 7)
1961		113 (1 2)	122 (1 3)
1962		108 (1 2)	109 (1 2)
1963		124 (1 3)	87 (0 9)

The infectious diseases reported most frequently in the Total Force were rubella glandular fever infective hepatitis and pyrexia of unknown origin Rubella was most frequent on the Home Station and pyrexia of unknown origin occurred more frequently in the Mediterranean Middle East and the Far East The figures for acute poliomyelitis glandular fever and infective hepatitis are shown in Table 8

There were 89 cases of acute poliomyelitis during the period — 50 in the Home Fleet and Shore Establishments and 39 cases on foreign stations Prophylactic vaccination was first introduced for personnel under the age of 25 and all hospital staff in contact with cases in 1958 and in 1960 it was made available to all naval personnel and all Admiralty civilians and families living abroad There were no cases in 1961 1962 or 1963

Infective hepatitis was probably the most important infective disease in the Second World War after respiratory tract and intestinal infections and malaria The case rate declined from 2 4 in 1953 to 0 9 per 1 000 in 1963 The incidence was very high at times reaching 9 4 on the Far East Station in 1956 and 8 3 per 1 000 in the Mediterranean in 1953 The improvement towards the end of this period was more marked on the foreign stations where these high rates were formerly reported but it was apparent in the figures for the Home Station

The annual incidence of glandular fever was surprisingly constant but the differences between stations were very variable and there were no pronounced or consistent differences between stations

Occasional epidemics of domestic fevers other than rubella such as measles chicken-pox and mumps occurred from time to time mostly amongst new entries in the Home Shore Establishments but the annual rate for any one of these infections was almost invariably less than 1 per 1 000

TABLE 9
Diseases due to sexual intercourse, Ratings
Rates per 1 000

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Syphilis	0 8	0 9	0 9	0 7	0 6	0 6	0 6	0 9	0 8	1 2	1 0
Gonorrhoea	16 1	14 8	10 1	9 1	22 2	16 0	16 0	22 6	20 9	15 5	18 7
Chancroid	3 5	1 3	1 3	1 1	0 6	0 5	0 5	0 8	1 5	1 3	1 0
Lymphogranuloma venereum	0 2	0 1	0 1	0 1	0 1	0 0	0 1	0 1	0 0	0 1	0 0
Other and unspecified venereal diseases	1 5	1 4	1 5	1 3	1 4	1 4	5 7	10 8	7 2	7 6	10 1
Total venereal disease	22 1	18 6	14 0	15 3	24 8	18 6	22 9	35 1	30 4	29 6	30 2
Urethritis non venereal	n a *	n.a	16 8	21 7	20 6	25 4	24 1	75 5	22 5	19 0	11 9
**TOTAL	n a	n n	30 8	36 5	44 9	44 0	47 0	60 6	53 0	48 6	42 1

*n a —not available **—total venereal disease urethritis non venereal

The annual rates for venereal disease and urethritis non venereal for ratings are shown in Table 9 The case incidence was lowest on the Home Shore Station and highest on the Far East Station usually The latter figures were eclipsed occasionally by those for the South Atlantic and American and West Indies Stations where the total numbers at risk were very small The incidence of venereal disease in the Home Fleet and Home Shore Establishments from 1953 1956 was very similar falling around 10 cases per 1 000 or less but during the succeeding years there was an increase in the Home Fleet incidence which reached a peak of 37 cases per 1 000 in 1960 This explains at least in part the increase in the case rates for all causes of sickness from 1957 onwards which is to be observed in Table 2 The most serious situation lay in the Far East where the annual incidence of venereal diseases alone between 1957 and 1963 varied from 121 to 152 cases per 1 000 per year The combined rates for all venereal diseases and for urethritis non venereal show some improvement on the prewar figures for

venereal diseases alone but are still disturbingly high. These infections contributed appreciably to the high case rate due to all causes shown in Table 2 for the Far East Station.

TABLE 10

Principal causes of injuries. Officers and ratings. Case numbers

(Total injuries) (Rate per 1 000)	1957 (5 565) (50·1)	1958 (5 181) (50·4)	1959 (5 246) (53·8)	1960 (5 130) (54·7)	1961 (4 848) (52·7)	1962* (4,400) (48·2)	1963 (4 724) (51·0)
Assault or intentional injury	216	197	204	182	203	149	148
Land transport	714	678	896	654	682	553	665
Complications of prophylactic inoculation and other therapeutic hazards	778	287	205	201	226	126	134
Football athletics etc.	1,289	1 137	1 240	1,097	1 076	1,018	937
Knocks cuts etc. and other accidental causes	2 122	1 954	1 815	1 843	1,675	1 583	1 831
Late effects of injury	328	315	386	450	495	583	592

*Following the adoption of the Joint Armed Forces Statistical Classification of Causes of Injuries the numbers of injuries in 1962 and 1963 shown to be caused by assault or intentional injury, the use of motor cycles or other land transport, prophylactic and therapeutic procedures and knocks and cuts etc. were less than in previous years. The numbers of injuries due to motor vehicles, other accidental causes and the late effects of injury increased.

The principal causes of injury for officers and ratings are shown in Table 10 for the years 1957–1963. After the respiratory diseases injuries caused a larger case incidence than any other group of disorders. The most frequent were knocks, cuts and other accidental causes, next were those due to recreational activities and the third accidents with motor vehicles.

The morbidity due to inoculation procedures and therapeutic hazards (largely the former) was not negligible and as these sick list figures grossly understate the actual amount of sickness caused by inoculation and other immunisation procedures, these figures underline the need for weighing the benefits to be gained from any routine mass immunisation programme against the incidence of these undesired effects which can sometimes be more serious than the diseases against which protection is sought.

Injuries due to enemy action only reached double figures in 1957 (22) 1958 (21) and 1962 (15). Flying injuries including parachute accidents were not very numerous: 1957 (25) 1958 (35) 1959 (27) 1960 (35) 1961 (25) 1962 (27) and 1963 (16) but the percentages which were fatal were higher than for most other types of accidents. There was no improvement in the total accident rate throughout the period 1953–1963.

TABLE 11
The most common causes of invaliding Royal Navy and Royal Marines Ratings and Other Ranks 1957-1963
Rates per 1 000

Year	Psychoneuroses and neuroses (C19)		Diseases of bones and other organs of movement (C47)		Other specified and ill defined diseases (C49)		Accidents poisonings and violence (C50)		Total (for 50 groups of diseases and injuries in the C List	
	R N	R M	R N	R M	R N	R M	R N	R M	R N	R M
1957	1 4	2 2	0 5	2 0	1 4	3 0	1 6	5 6	11 2	19 8
1958	1 3	1 9	0 3	1 3	1 4	1 1	1 4	3 8	9 7	14 9
1959	1 8	2 6	0 4	2 0	1 1	1 9	1 6	5 1	9 6	19 5
1960	2 5	1 8	0 3	1 5	1 3	0 9	1 7	5 1	11 3	14 3
1961	2 5	2 8	0 4	1 1	1 2	2 0	1 3	4 2	11 2	17 8
1962	2 7	3 9	0 3	1 8	0 9	2 5	1 5	4 4	10 7	20 0
1963	4 1	6 8	0 2	1 7	0 8	2 3	1 2	6 9	10 4	25 3

Causes of invaliding

The final invaliding rates for officers and ratings combined are shown in Table 1 The high figures for the Total Force were largely due to invalidings for ratings The most common causes of invaliding for ratings and other ranks of the Royal Navy and Royal Marines are shown in Table 11

Psychoneuroses and accidents etc were responsible for more than half the invalidings for both groups in 1963 and the increase in the rates for these two groups explains the rise in the Royal Marine invaliding rate between 1962 and 1963 The trends for officers were similar although the rates were not so high (Table 12)

TABLE 12
Total final invalidings Royal Navy and Royal Marine Officers 1957 1963

Year	R N Officers		R M Officers		Total Officers	
	No	Rate per 1 000	No	Rate per 1 000	No	Rate per 1 000
1957	45	3 5	1	1 5	46	3 4
1958	27	2 3	1	1 6	28	2 3
1959	28	2 6	1	1 7	29	2 6
1960	33	3 2	3	5 7	36	3 3
1961	47	4 6	5	8 6	52	4 8
1962	35	3 5	4	6 7	39	3 7
1963	25	2 4	5	8 0	30	2 8

Causes of death

The annual death rates for officers and ratings combined ranged between 0 9 and 1 6 per 1 000 The rates for officers were higher than the age standardised death rates for ratings partly because of aircrew accidents involving officers

During the 11 year period there were 1 616 deaths of officers and ratings 998 deaths were due to injuries and 618 were due to diseases The most frequent causes of deaths from disease were as follows

Arteriosclerotic and degenerative heart disease (81)	106 deaths
Malignant neoplasms (A45 47)	91 deaths
Vascular lesions of the central nervous system (A70)	29 deaths
Leukaemia and aleukaemia (A58)	22 deaths

Arteriosclerotic and degenerative heart disease caused more deaths than any other group of diseases This group accounted for 24 deaths in 1960 of which 23 were deaths of ratings Sixteen of these were due to coronary disease and four of the ratings were 27 years of age or younger the youngest being only 21 The cause of death was confirmed at autopsy for each of these four cases No explanation can be found for the increase in the numbers of fatal cases in this particular year

If leukaemia and aleukaemia cases are included under the malignant neoplasms this group of diseases was the most frequent cause of deaths due to disease

Between 1934 and 1944 approximately one-tenth of all deaths due to disease each year were due to pulmonary tuberculosis (Roberts 1944) During this 11-year period there were only two deaths from this cause one in 1957 and one in 1960 There were no deaths amongst officers

WOMEN'S ROYAL NAVAL SERVICES 1953 1963

Gynaecological diseases apart the trends in the much smaller Women's Royal Naval Services were usually similar to those for the men The most common diseases were the acute respiratory tract infections and influenza The reduction in skin infections was greater than for the men On the other hand the incidence of appendicitis was usually twice that for the men but declined notably in 1962 and 1963 This improvement was more than offset by an increase in gastroenteritis and colitis The annual case rate for pulmonary tuberculosis always remained below 1 per 1 000 and there were no cases in 1958 and 1962 Psychoses and psychoneuroses accounted for 44% of all final invaliding during the period

DISCUSSION

The validity of these figures is dependent on the accurate completion of the In patient Record Form as prescribed by the regulations and confirmation of the final diagnosis by the medical officers in charge of the cases This is a feature of all statistical reports of this nature and the Royal Navy is probably served as well as most other Government agencies in this respect and very possibly better than most The use of the In patient Record for statistical purposes eliminates a vulnerable link in the preparation of the Reports prior to 1951 namely the nosological tables in the medical officers' journals on which the case numbers were based and it reduces the likelihood of duplicated or triplicated reporting of cases On the other hand illnesses of less than 48 hours' duration are excluded from

entry on the In patient Record Form and thus from the Annual Statistical Reports and so are all cases on the Attending Lists

The death rate for the Total Force has not varied greatly during the last fifty years except in time of war It no longer provides a yardstick with which to measure the health of the Navy as it did in the past Invaliding rates fluctuate with factors other than health alone such as medical standards for recruiting or retention in the Service or the manpower requirements of the Fleet We are left with the sick list case rates the days sickness per head and the sick daily rate to assess the impact of ill health on the Navy These suggest that there was an overall improvement during the period under review although the high case rates for respiratory tract infections influenza gastroenteritis and colitis injuries and venereal diseases the high invaliding rates caused by neuropsychiatric disorders and the fact that two thirds of all the deaths in peace time were caused by injuries not by disease focuses attention on the areas where preventive measures might be intensified

Thus these Reports in their present form do not include much of the minor sickness and injury which may contribute to the loss of working hours inefficiency and lowered morale Furthermore reports based on In patient Record Forms will usually be two years out of date at the best by the time they are printed and may be as the naval reports are now even more so

The last Royal Naval Medical Statistics Committee (1946) which included among those signing two Medical Directors General of the Navy Sir Sheldon Dudley and Sir Henry St Clair Colson and the wartime and post war Consultants in Medical Statistics to the Navy Professor Major Greenwood and Dr J A Fraser Roberts advised the use of a census system for short term as opposed to long term statistics With such a short term system the numbers of cases in any one broad disease category would be counted at a fixed time each week for example at midnight on Wednesday and reported by air letter to the Admiralty This technique was used successfully after the Second World War to examine the effects of variations in station and upper deck air temperature on the incidence of diseases and injuries on the Sick Lists and Attending Lists of all ships carrying a medical officer (Roberts 1948 Ellis Smith and Underwood 1953 Smith 1958) Whereas the cases on the Sick List were relatively insensitive as an indicator of the effects of climatic extremes cases on the Attending List provided valuable information concerning the levels of warmth above or below which ill health increased in the Fleet

With the computer services available today (the first computer only became operational in 1946) the possibility of instituting short term sickness returns might be reconsidered Weekly returns analysed by computer could provide an almost immediate check on the health of the Fleet and more frequent returns could be requested by signal if this ever became necessary Without something more than the present machinery the Statistical Health Reports will continue to remain primarily of historical rather than of immediate operational importance

SUMMARY

During the years 1953–1963 the numbers of cases on the sick list the admissions per head and the sick daily suggest that the health of the Royal Navy improved

Attention is directed to some of the more important trends and it is proposed that consideration that the Annual Reports on the Health of the Navy derived from the diagnoses on In patient Record Forms be supplemented by short term summary returns of cases on the Sick Lists and Attending Lists of ships and establishments

ACKNOWLEDGMENTS

This paper is published by permission of the Medical Director General (Naval) Ministry of Defence Surgeon Vice Admiral E D Caldwell I am deeply indebted to Sir Austin Bradford Hill for comments and advice to Mr E Jones Miss Olive Jones and Mr J R Legg of the Statistical Division (Navy) and to Mr W G Grant Mr J S Stevenson and Mr T W Wicks of the Medical Department for the statistical work and the preparation of the numerous tables of which a very brief summary is attempted here

The information and data in Tables I to 12 are CROWN COPYRIGHT RESERVED

REFERENCES

Admiralty Book of Reference 26(1) (1960) Report on the Health of the Navy for the Years 1953 to 1956

ELLIS F P SMITH F E and UNDERWOOD C R (1953) *Brit J soc Med* **2** 69

ELLIS F P and ROWLANDS R A (1966) *J roy nav med Serv* **53** 5

Lancet editorials (1838) **i** 307 310 **ii** 193 197 **ii** 121 125

ROBERTS J A F (1944) *An Analysis of Invaliding due to Disease and Death due to Disease* 1934 1943 (1944 added later) *Admiralty Book of Reference* 1235

ROBERTS J A F (1948) *Brit J soc Med* **2** 55

SMITH F E (1958) *Brit J industr Med* **15** 197

Statistical Reports on the Health of the Navy for the years 1830 1843 1856 1915 (H M S O) 1921 1936 (H M S O)

THE HISTORY AND DEVELOPMENT OF THE MEDICAL SERVICES OF H.M. DOCKYARD, CHATHAM, 1625-1966*

By David S. Wright

PREFACE

I was appointed Assistant Medical Officer H.M. Dockyard Chatham in July 1965. On my arrival there I found a large manuscript volume which contained copies of letters to and from the Surgery of the Dockyard from 1859-1871 and it was this volume which aroused my interest in the history of the Medical Services of the Yard. My enquiries soon revealed that an Industrial Medical Service of sorts had been carried on in this ancient Yard from the time of Charles I well before Ramazzini had begun to study and write about the diseases of workers.

This is by no means a complete history of the services. My first visit to the National Maritime Museum revealed that there were over one thousand manuscript volumes concerning the Yard and another similar number were in the Public Records Office. Thus I had not time to examine all these let alone the State Papers which refer to the Yard from time to time. The only history of the Yard is the Notes by Admiral Crace (Crace 1946) a former Admiral Superintendent at Chatham and even these were never published. There is no medical history written and at the Admiralty all medical records before 1914 save a few preserved in the Public Records Office have been destroyed so the task of discovering let alone collating all the possible material would take some years and it is for this reason that this history is so often incomplete and that I have appended no Bibliography.

While my researches have been of great interest to me it is in the belief that looking into the past is of benefit and interest to those planning the future that this dissertation is written.

CHAPTER 1

1547-1625

Early Years of Chatham Dockyard

When as a result of the Reformation of the churches Spain replaced France as the traditional enemy of England the main threat to our shores came no longer from Normandy but from the Spanish Netherlands. Portsmouth had been our principal naval base but now the Thames and London were directly threatened and strategy dictated that a base be found to guard the river. Somewhere with a good rise and fall of tide was required and a muddy bottom on which the ships could rest while being repaired. Thus it was that in 1547 (Crace 1946) a store house on the banks of the Medway was rented for 13s. 4d. per annum and Chatham Dockyard was born.

**This dissertation was awarded the Neysholme Dissertation Prize for the D.P.H. (London) 1967.*

The exact position of this store is not known but it was in the vicinity of Saint Mary's Church For the first twenty years during which other storehouses were added the yard was known as Jillyngham Dock though it was much nearer Chatham than the fishing village which is now the town of Gillingham It became Chatham Yard in 1567 and has remained so ever since though with the expansion of the Yard to the North and East and the confluence of the Medway towns the Yard now lies much more within the boundaries of Gillingham than those of Chatham

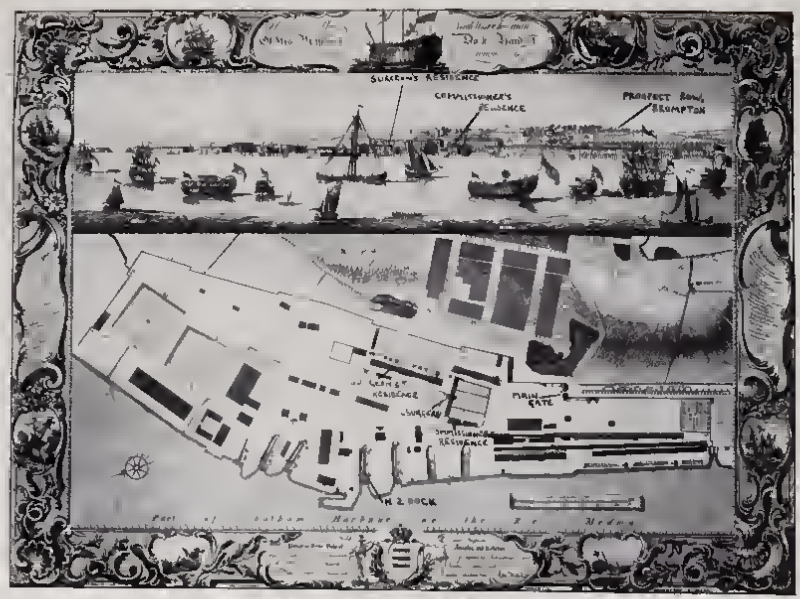
On Queen Mary's death in 1558 the rivalry between England and Spain flared up once more and during the reign of Queen Elizabeth I Chatham Yard took on a greater importance in the defence of the country In 1570 a Mast Dock was dug out for the seasoning of timber for masts and spars and a local mansion Hill House close by Saint Mary's Church was furnished for the use of dockyard officers A forge and additional storehouses were added in the following year and ten years later the first graving dock was dug and shortly afterwards gates were added to it and it became the first dry dock.

Already at this early period so many ships were lying in the Medway that the authorities feared an expedition might be mounted from the Netherlands to destroy them The main channel up the Medway was therefore closed with stakes and a chain and Upnor Castle was built to secure the safety of the fleet

At Chatham in 1590 the earliest form of marine health insurance (Keevil 1957) was instituted by Sir Francis Drake and Sir John Hawkins Hawkins has been depicted by historians as more a pirate than a humanitarian but he was an astute leader who appreciated that fit men were necessary for sailing and fighting his Queen's ships and also that those injured in her service and no longer able to go to sea were likely to find themselves destitute and in need of care Thus it was that he founded the Sir John Hawkins Hospital — a hostel for twelve pensioned seamen and the Chatham Chest at about the same time

The original foundation (Allison 1943) of the Chatham Chest came about by an Act of Parliament which required every parish in the country to provide a weekly sum for the maintenance of the disabled seamen who had been born and were resident within its boundaries The difficulties of administration of such an Act must have been considerable and a system of compulsory payments by deduction at source from seamen's wages was instituted This must have been much simpler and was introduced at the suggestion of Sir Robert Mansell Treasurer of the Navy in 1604 The funds were to be administered as a Trust under the guardianship of the Commissioners for the Sick and Wounded the surplus to be locked in a great chest kept in Saint Mary's Church and opened only by five keys held by five different persons The Chest was supported by a monthly levy of sixpence from sailors and shipwrights earning more than ten shillings a month and a further twopence from boys It was administered originally by five Principal Officers of the Yard and pensions or gratuities were paid from it to those possessing smart tickets Now called Hurt Certificates these still exist in the Royal Navy today in some ways unachronistic but still the ultimate proof of injury received while on duty and in the event of all other documentation being lost still

Plate I *Plan and Elevation of HM Dockyard Chatham in 1755*



Reproduced [illegible] by The Trustees of the National Maritime Museum

of use in deciding whether payment of a gratuity or a pension should be made. The amount paid from the Chest depended on the assessment of the surgeon at a survey upon the individual whose injury had to be equivalent to the loss of an arm or a leg for payment to be made. Some of the old smart tickets are still preserved in the Public Records Office and the assessment of the varied injuries in these terms seems to be an attempt at defining a man in modern terms as Registered Disabled.

A fine concept the Chatham Chest was soon in trouble and its full history would fill a volume of its own. It was necessary for an entitled man to present himself personally at Chatham to collect his pension and this for a man maimed or blind was a difficult undertaking if he did not live in that district. Large sums of money accumulated and by no means all of it found its way into the pockets of those whom the founders of the Chest had wished to help. There were many scandals in the 213 years history of the Chest, which now lies empty in the National Maritime Museum, Greenwich but the ideas of health insurance to which it gave rise were an example to the world and Williams (1951) ascribed the origins of the United States Public Health Service directly to the Chatham Chest. There were over £1½ million (sterling) in the funds when they were finally transferred to Greenwich and amalgamated with those of the hospital there in 1803. In spite of the vicissitudes through which it passed the funds of the Chest were no doubtedly of very great value to the sick.

In 1619 Chatham Dockyard underwent major changes. A new set of buildings was erected to the north of the Old Dock as it became known and these formed three sides of a quadrangle the river forming the west side. The south and east ranges were officers houses while to the north lay the tar pitch iron and sail stores and behind the latter the deal stores. Within the quadrangle was the first dry dock and later in the century further docks and a slipway were added.

Greater numbers of men were now employed in the yard. Sailors from the ships in Ordinary (i.e. those in commission lying in the Medway undergoing repair or refitting) worked on the ships as well as those ship keepers labourers and others hired locally and accidents must have been common. As a result in December 1625 (Keevil 1957a) a local barber surgeon was appointed by warrant from the Lord Admiral on the advice of the principal officers of the Navy. He was not a sea surgeon but a civilian practitioner he received no victuals and was paid a retaining fee of twenty marks (£13 6s 8d.) per annum supplemented by twopence per month from shipwrights paid in a similar way to the payments to the Chatham Chest.

It seems probable that the appointment of John Pawson to look after the men employed in shipbuilding and repairing was the earliest appointment of what we now know as an Industrial Medical Officer in the world. Surgeons had long since served armies on land and sea but as far as I have been able to ascertain none had been appointed before to serve men in industry. An increasing respect for the medical profession and a diminution in the wise women and dealers in simples who had served the Elizabethan poor marked the early part of the seventeenth

century and with the rise of the middle class the private physician or surgeon became less important and general practice began to grow

Thus it was that at a time when the sciences of medicine and surgery were beginning to revive from many years of comparative attenuation the medical services of H.M. Dockyard Chatham were born

CHAPTER II

1625-1800

Foundations of the Medical Service

When John Pawson was appointed to Chatham Yard the Society of Apothecaries had for only eight years held the Royal Charter The struggle between the Society the Barber Surgeons Company and the College of Physicians was often bitter as each sought authority and money This did nothing to improve the standards of surgeons or physicians and it seems unlikely that the Dockyard surgeons were either well qualified or expert Their recommendations were not necessarily from medical men, for in 1625 the officers of the King's works at Chatham engaged with preparations for the expedition to Cadiz petitioned the Commissioners of the Navy that John Norton might be recommended to the Lord Admiral the Duke of Buckingham for a warrant appointing him to the Yard to join John Pawson who was then the Surgeon in Ordinary This recommendation was not accepted as Pawson was appointed Surgeon of the Extraordinary or surgeon to the Dockyard civilians in addition to his appointment with the ships The Chief Officer had reported that the removal of work to Chatham from Deptford and Woolwich had resulted in more work than Pawson aged and of poor experience could cope with and that Norton was an able surgeon and good physician However Pawson continued and Norton died Richard Wye being appointed to assist him in 1625 and to succeed him in 1639

The precise duties of the Surgeon of the Ordinary and the Surgeon of the Extraordinary do not seem in this early period to have been clearly defined and it is doubtful if during the seventeenth century both were always appointed In the Tudor Yard begun in 1619 the house at the end of the south range by the river, is noted as the Surgeon's residence and presumably Pawson and Wye lived and probably worked in this building Wye was still there in 1661 but no details of his life or work have been discovered except a mention in the Account Book of the Chatham Chest for 1637 44

To Richard Wye Junior Chyrurgeon to the Extraordinary att Chatham for one extraordinary cure by him performed on Richard Cook Boatswaine of the St George £2 10s

In 1666 during the second Dutch War John Evelyn the diarist and an active Commissioner of the Sick and Wounded planned the building of an infirmary at Chatham for the care of wounded seamen and his plans received the Royal Approval After the Navy Commissioners had examined his plans he reported in his diary (Keevil 1958) how they

having seene the project of the Infirmary encouraged the worke & were very earnest it should be set about speedily but I saw no money though a very moderate expense would have

saved thousands to his Majesty and [illegible] much more [illegible] suffering our sick and wounded than the dispersing of them into [illegible] tiny more Chirurgic ones & tenders were necessary & the people tempted [illegible]

Evelyn visited Chatham on 13th March 1666 to choose a site and afterwards tried to impress upon Samuel Pepys Secretary of the Admiralty the necessity of building the hospital but the impecunious Treasury were unable to raise the money and no hospital materialised

Such a building would have been put to an early use for in 1667 the Dutch Fleet broke the chain guarding the Medway with fireships sailed past the now rotten stakes past Upnor Castle (hampered by the fact that the wrong sized shot

[illegible] 1865 [illegible]

for the cannon [illegible] and [illegible] sixteen British ships The wreck of one of these ships the *Chatham* [illegible] was discovered when the present Number Two basin was being constructed in 1870 and two of her guns were mounted in front of the Dockyard Surgery They can be seen in the old photograph of this building (Plate II) and now stand on the green in front of the Admiral's House

In 1669 John Conny of Rochester was appointed Surgeon of the Ordinary It seems likely that he was Surgeon of the Extraordinary as well for the state of the Navy was allowed by King Charles to run down at about this time England and France joined forces against the Dutch in 1672 and peace came at last in 1674 the

English and Dutch forming an alliance after the marriage of Princess Mary of England and William of Orange in 1677

John Conny (Keevil 1957*b* and 1958*c*) was a man of considerable experience. He kept a log while surgeon of a merchantman, the *Peregrine* from 1648-1650 recording many cases of scurvy and obviously ignoring the advice of Captain John Smith who had recommended lemon juice in 1626 many years before James Lind proved its real value scientifically Conny whose views were those of the majority of sea surgeons was in a second rate in 1654 and became Surgeon and Mayor of Rochester in 1676 presumably establishing himself there as a result of his Dockyard appointment. He was later to become a warden of the Barber Surgeons and was Master of the Company from 1689 90 Of his duties in the Dockyard nothing is recorded and it seems that in 1684 there was another Surgeon of the Extraordinary there as his pay is recorded as being £26 1s 8d whereas Conny as Surgeon of the Ordinary received £30 8s 4d — both plus their two pences which in Conny's case increased his pay to the extent that he received £20 in one quarter of that year from this source his assistant receiving £15 This unnamed assistant may have been the Surgeon of the Extraordinary and have lived in the Dockyard

Conny's signature appears on several forms forwarded by James Pearse Surgeon-General of the Forces, to Samuel Pepys These documents are to be found in the Pepysian Library in Magdalene College Cambridge and in them Conny is designated as appointed to take care of the Sick and Hurt Men sent from his Majesty's Ships to the Town of Rochester

John Conny after over fifty years of service to sick seamen finally retired in 1699 In June that year in the journal of the short-lived Registry in taking care of the Sick and Wounded in his Majesty's Service we read that

> Dr John Conny, one Officer for the Sick and Wounded at Rochester having signified his desire to resign that employment and that his son Dr Robert Conny may be appointed in his room, resolved that instructions be prepared and sent to him accordingly

The young Dr Conny duly took office but by this time the appointments to the Dockyard and to the Ordinary were definitely quite separate and Dr Robert Conny appears to have had no function in the Dockyard itself Dr Thomas Drewitt (or Druitt) had been appointed to the Dockyard on 8th March 1695 shortly after a pay review had increased the salary of Dockyard Surgeons to £40 per annum in addition to the twopences from the shipwrights and labourers The riggers and sailmakers in the Yard came under the care of the Surgeon in 1708 on payment of their twopences The total pay of Dr Drewitt in 1696 including his twopences and his payment as an officer of the Chatham Chest amounted to £162 4s 5d

It is possible to judge the relative standing of the surgeon to that of other officers in the Yard by the pay scale recorded in the Standing Orders to the Yards

Master Attendant Master Shipwright, Storekeeper Clerk of the Cheque, Clerk of the Survey	£200 p.a.
Master Shipwright's Assistant Master Caulker	£100 p.a
Boatswain of the Yard	£ 80 p.a
Surgeon	£ 40 p.a

Porter	£ 30 p a
Master Repsmaker Master Sailmaker	per diem
Master Joiner Master Bricklayer Master House Carpenter Master Mason	2 £ per diem

Those of whom the annual salaries are given had residences inside the Dockyard This cost the Surgeon his overtime when England declared war on France and Spain in 1702 for a letter to the Commissioner of the Yard from the Navy Office allowed

> extra times to the Instruments of the Officers of your Yard when they shall be so employed as was done in the last war excepting the Chyrurgeon who having now a house in the Yard and being always in readyness to answer such occasion as may call him

Then, as now the surgeon's basic pay was for twenty-four hours a day

The Surgeon's Chest containing his medicines and instruments and a constant source of grievance between Naval surgeons and the Apothecaries and Surgeons in London was to be provided at the Common Hall of the Company of the Apothecaries In the same order we read no pay for surgeons until they produce certificates from the Commissioners for the Sick and Wounded and the Governors of the Company of Surgeons Many of these certificates are preserved in the Public Records Office but I was unable to find one relating to a dockyard surgeon nor do the journals of proceedings of the Commissioners for the Sick and Wounded contain details of these men Both the certificates and the journals refer to naval surgeons and civilians in dockyards seem to have been left to get on with their work without overmuch supervision

The forty hour week and holidays with pay were quite unheard of in the early 18th century Work in the Dockyard was not easy to come by and was considered (and remained so until very recently) a good reliable job Thus was in spite of the fact that on several occasions in the history of the Yard there was insufficient money left after rations officers had helped themselves to pay the men Robinson (1958) suggests two reasons why men continued to work in the Dockyard in spite of the long hours and intermittent pay Firstly the Vagrancy Laws of 1546 and 1572 the Poor Law Act of 1601 and the Act of Settlement of 1662 made it almost impossible for a man to leave his district without being arrested It is doubtful if there would have been any alternative work in the Medway Towns and secondly the fact that there were pickings some legal and many illegal to be had in the Yard One of these, the privilege of taking small pieces of waste timber out of the Yard was constantly abused The men could take as many of these chips as they were called as they could carry under one arm It seems very possible that men demonstrating against their lack of pay flaunted their grievances by carrying out a good deal more than they were allowed balancing the wood on their shoulders an act which may well have given rise to the expression carrying a chip on one's shoulder

One cannot blame the men for the Commissioner Sir Edward Gregory in 1693 wrote to the Navy Board the case of the men is truly deplorable and since I can but make a shift to live from my very heart I wonder how they rub through A year later he wrote again to the Board after a man had been caught in the act of stealing from the Yard asking for the utmost severity that Law or Justice can

inflict upon him (presumably hanging or transportation) in spite of the fact that he admitted that the man was owed a year's wages

These then were the conditions under which men worked in the Yard and work was six days a week for fifty two weeks in the year the only holidays being on the King's birthday King's Coronation Day Fifth of November and Twenty-ninth of May On the normal week day working hours were from 6 a.m. till 6 p.m. light permitting but on these holidays they were six until twelve o'clock and be paid a full day's wage

While the workmen had little time for relaxation or pleasure life was not smooth for the surgeons of the Navy and of the Dockyard who continued their struggle with the leaders of the profession in London Ships surgeons received a free gift towards the cost of supplying their medicine and instruments which they had to purchase themselves and have examined in London In 1717 they wrote a bitter letter of complaint about the charges made by the Apothecaries for the medicines a letter which actually had some effect as prices were reduced The Surgeon's Company was the target in 1739 for the Naval Surgeons addressed a letter to the Navy Board beginning

Honoured Gentlemen We the Surgeons of His Majesty's Navy apprehending your Honours unacquainted with the impositions we labour under from Surgeons Hall (by which we not only suffer but His Majesty's Service also) have taken the liberty of laying our case before you begging for such relief from this avaricious tyranny as your Honours shall think consistent for the good of His Majesty's Service

It appeared that the irregularities of qualification were such that a surgeon could be qualified for a ship with about 100 men but not one with 150 men — and it would cost another £20 £30 to gain this qualification

The whole system of qualifying as a doctor at this time was very suspect and it is to be hoped that the plea from the Naval Surgeons played some small part in improving this

At this time Chatham Dockyard was in as low a state as the men who worked in it — if there is a purgatory upon earth I am in it here one Commissioner Sir Richard Beach was moved to proclaim in 1678 Numbers working in the Yard were smaller than they had been during the preceding century only 890 in 1700 and there must have been an air of despondency about the place which only Britain's military successes in the early 18th century dispelled

The Yard in the first half of the 18th century underwent a transformation as it had a hundred years before The Admiral Superintendent's House (1703) the Clock Tower Building (1716) the Ropery (1719) the Main Gate (1720) the Sail Loft (1723) and the Officers' Residences a fine terrace of 12 houses (1729) stand today much as when they were built

In about 1711 a small row of buildings was erected against the wall of the Commissioner's garden to the North This row still stands today (Plate III) and is used as a recreation club but it seems to have been built to replace the old Surgeon's House of the Tudor Yard not as his residence but as the first proper surgery The comments of Staff Surgeon Gunn 150 years later (see Chapter IV) were none too kind about this building but must have been a great step forward for the surgeon to work in a purpose built surgery

Plate III *The Surgery 1711 1867*

Thomas Drewitt was still there as the Surgeon in 1700 but when he left or died is uncertain though he may have continued until Peter Logie's arrival in 1725 Four years later Logie received a substantial pay rise — present salaries considered small compared with those in ships It was increased to £100 per annum and the surgeon was obliged to keep at his own expense an assistant who had served three years under the Surgeon of a Dockyard or some other experienced Surgeon

Although I have been able to discover no definite orders on the subject until 1801 it seems very likely that by the middle of the 18th century the Surgeon may have been required to give some opinion as to the fitness of men to work when they entered the Yard for a standing order stated that no old lame infirm or unqualified men were to be entered This may well be the beginning of Entry Medicals still with us today and a valuable tool of preventive medicine in industry

The middle of the 18th century saw the great years of Robert Clive and William Pitt the Elder First Earl of Chatham While the former laid the foundations for the British Empire in the East the latter's policies in Europe and America were making Britain the greatest power the world had known

Pitt realised that for Britain to become and remain a great nation a strong Navy was needed to protect our shores to maintain our lines of communication and to carry our armies to victory In 1758 on Pitt's instigation a bill for laying down 12 ships of the line was passed through Parliament and orders were given for the building at Chatham of a First Rate a hundred gun ship the equivalent of the aircraft carrier of yesterday and the Polaris Nuclear Submarine of today So it was that on 23rd July 1759 the keel of the most famous ship the world has known was laid in the Old Single Dock at Chatham and *HMS Victory* was launched on 7th May 1765

John Hammond appointed in 1754 or before was Surgeon in the Yard during *Victory's* building Apart from his warrant renewed in 1761 on George III's accession for a sum of £3 3s 6d we hear nothing of him and he was succeeded in January 1774 by Hugh Mackleraith

The hospital for which Evelyn had pressed in 1666 had never been built though that at Portsmouth the Royal Naval Hospital Haslar was begun in 1745 and James Lind the father of preventive medicine and author in 1753 of the famous Treatise of the Scurvy was Physician in charge there when Mackleraith went to Chatham In 1757 however directions were given for the establishment of a Marine Infirmary at Chatham and a site was found The infirmary was built shortly afterwards but whether it was used for injured men from the Dockyard I have not been able to discover though it is unlikely What does seem probable is that it was this same Infirmary which was converted in 1827 to become the Melville Hospital and this was certainly used by dockyard men until the Royal Naval Hospital was opened in 1905

In 1787 when the younger Pitt was trying to restore some order in the country following the years of war with final loss of America there was an enquiry into all the Royal Dockyards every officer was examined and enquiry made as to his work and pay Mackleraith was no exception

> The examination of Hugh Mackleraith Esq. taken upon oath on 23rd October 1787
>
> This examinant saith that he is the Surgeon of His Majesty's Dockyard Chatham and he has been so since January 1774
>
> His duty is to take care of the Artificers Labourers Sawyers and Riggers in all their Hurts and Wounds received in doing their duty in the Yard (his Ordinary at this port is under the care of another person) and it is also a part of his duty to take charge of the Watch alternately in turn with the other Officers of the Yard
>
> His attendance is constant he or his assistant being always obliged to be in the way in case of accidents during the working hours of the Yard
>
> He has a salary of £100 a year reduced by the Civil List deduct on to £97 11s 0d and he has an allowance of 2d per man per month from the Artificers Sawyers Riggers and Labourers borne upon the books of the Yard For which allowance he attends them and finds external Applications Dressings and Remedies in Surgery This allowance amounted in the year 1784 to £151 4s 6d making his receipt for that year £247 14s 6d out of which he paid his assistant fifteen guineas and the remainder being £231 19s 6d he retained for his own use entirely
>
> He is likewise one of the Surgeons to the Chest at Chatham for which he has a salary of £60 a year paid
>
> He has no other Employment or Emolument under Government nor are there any Fees, Gratuities or Perquisites appertaining to his office or situation or received by him

Mackleraith's examination is the first indication found that the Surgeon had duties other than medical to perform Letters to and from the Yard at this time reveal a constant watch for theft from the Yard round which a high wall had been

constructed complete with watchtowers when the Yard was developed earlier in the 18th century. A letter concerning fire appliances is included amongst others from Dockyard Officers to the Admiralty in 1794 and it was presumably in connection with his duties with the Watch that Macklerath came to sign this and he was thus involved in the safety and security of the Yard.

The allowance from twopences mentioned indicates an average of 1,500 workmen in the Yard. The Ropeyard, built within the boundaries of the Georgian Yard (but not within those of the Tudor Yard) was still not included in the figures and it may have been as a result of the enquiry that this came about for an order of 1794 instructs the Surgeon to attend the Ropemakers for the first time. They have not been included in the figures for workmen in the Yard during the latter part of the 18th century given in Appendix A.

The end of the 18th century was a time of great activity in Chatham. The anxiety of events across the water during the French Revolution led to a build-up of our Naval strength and war broke out again. By the closing years of the century Napoleon was almighty in Europe and England was in danger of invasion. In 1800 *HMS Victory* had been lying in the Medway for three years during which time she had been used as a Prison Hospital Ship. In that year the decision was taken to restore her to her fighting role (Thomson 1959) an operation which took the next three years to complete and cost nearly £71,000 as compared with the original building cost of £63,176.

Lord Nelson visited *HMS Victory* during her refit and is reputed locally to have lived for a while with Lady Hamilton in Prospect Row, Brompton. This fine terrace still stands almost as it was then and it can be seen in Pocock's Portrait of the Yard painted in 1792 and now in the National Maritime Museum (Plate IV). From the top windows of Number 12, Prospect Row, the house in which I lived for nine months, there is a fine view and it is possible that from here Nelson could have looked down over the Dockyard and watched *HMS Victory* being prepared for what was to be the greatest hour of British Naval history.

CHAPTER III

1800-1859

Regulation of the Medical Service

The examination into the affairs of the Dockyard in 1787 seems to have heralded a time when the organisation of all departments of Naval Dockyards came under close scrutiny. Macklerath's duties as laid down in his deposition are but vaguely defined and from this time on there comes a flow of orders and instructions. Macklerath must have attended sailors from *HMS Victory* as well as dockyard workmen for an order of 1801 required him to attend the sick of the Ordinary. It is in another order a few days later that the first definite instructions are given regarding the examination of new entries into the Yard. This order states that all workmen and apprentices are to be examined on entry, that unless men hurt report to the Surgeon and their names are entered on the Hurt List, they will have no claim for compensation, that the Surgeon is to supply trusses to those

Plate IX HM D[illegible] ... the original pre[illegible]
Reproduced by kind p[illegible] ... National Maritime M[illegible]

Key

A River Medway
B Saint Mary's Creek
C Mast Ponds
D Ship Building in Number 3 Dock
E Clock Tower
F Watchtower in Dockyard Wall
G The Terrace (Officers' Residences)
H Commissioner's Residence
J Gillingham
K Sail Loft
L Brompton
M Gate
N Ropery
O Marine Barracks (site of Melville Hospital)
P Chatham Lines (Defensive ramparts constructed in c. 1[illegible] extended 1803)

receiving hernias during the performance of their duties that the Surgeon is to keep a Sick Book in which the names of all those on the Sick List are to be kept

In 1805 a large volume of orders was issued—Instructions to the Commissioners and Principal Officers of His Majesty's Dockyards Mackleraith was not a Principal Officer nor Head of his own department but the Surgeon had a number of instructions He was required to examine all artificers workmen and persons of every description and to issue a certificate of fitness No foreigner was allowed to enter the Yard and no apprentices but such as are stout well-grown boys not under the age of 14 years or of less height than four feet ten inches tall

The last instruction is of particular interest for it came at a time when child labour was being exploited to the full in many industries notably the cotton industry in Lancashire It was many years before the use of such labour was prohibited by law and the Admiralty were well in advance of their time in the limits they imposed

Another instruction states that none over the age of 35 is to be entered as a rigger or a rigger's labourer The work of a rigger then was more arduous and dangerous than now but again the Admiralty shows a concern for the safety of workmen unusual for that time

The work however was not becoming softer Working hours were still from 6 a m to 6 p m while light permitted with one and a half hours for midday dinner in the summer and an hour in the winter presumably there were no canteen facilities in the Yard and most of the men went to their homes They had half an hour for breakfast in the summer but in winter did not start work until eight having had their breakfast

Certificates of sickness were also required—

If any artificer or other workman should continue to be absent without leave for more than six successive working days you [the Clerk of the Cheque] are forthwith to discharge him from the service excepting in cases of sickness which are to be certified by the Surgeon

The Surgeon then like the General Practitioner today was required to provide his own locum if he had any leave according to another order

There is a careful distinction drawn at this time between the Wounded and Hurt on the one hand and the Sick on the other The Admiralty learning perhaps from the early lessons of Drake Hawkins and the Chatham Chest were generous in their attitude to the first but sickness is regarded as unfortunate but definitely not compensable This is shown in all orders for Dockyards from this time until it became recognised that some diseases were as much the result of a man's work as were physical injuries

In 1803 the Chatham Chest at last left its birthplace The funds were amalgamated with those of the hospital at Greenwich and the Chest Room the room in which the Surgeon examined applicants for pensions next door to the Surgery was converted and became the Admiral's office The Chatham Surgeon's connection with (and pay from) the Chest ceased

Until 1805 when the new and more definite orders referred to above were introduced the Dockyard Surgeons must be considered as civilian rather than Naval Officers They were appointed by Warrant from the Navy Board not by the Admir

alty they were not liable to service at sea and they did not wear uniform The distinction between civilians and servicemen is however a fine one as far as Surgeons are concerned, for the Naval Surgeon is only distinct from his Dockyard colleague in that he served at sea Neither group of Surgeons would have been regarded as Officers in the Navy until 1805 when an Order in Council permitted Medical Officers to wear a distinguishing uniform and to have similar rank with Officers of the same class in Your Majesty's land forces to be subordinate however to Lieutenants in Your Majesty's ships (Lloyd and Coulter 1963)

Naval Surgeons regarded this as their Charter to be considered as Officers of Wardroom rank but although this was officially the case, they were not commissioned officers until 1843 Furthermore there continued to be a difference in pay between Dockyard and Sea Surgeons for another hundred years

Whether Dockyard Surgeons donned uniform in 1805 I have been unable to discover but another reason for considering the Surgeons to be Naval Officers from this date is that John White appointed in 1803 is mentioned in the list of Medical Officers in Steel's unofficial Navy List whereas Mackilrarth who is known to have been in the Dockyard in 1794 two years after the list first appeared is not mentioned

At the beginning of the 19th century there was a massive build up of the Navy and Chatham Dockyard was bustling with activity The Battle of Trafalgar assured for Britain a complete domination of the seas which was not seriously to be threatened for over a hundred years and during this century the size of the Navy was never again as large as it was in the Napoleonic Wars For the 50 years or so after Trafalgar the Dockyard was a comparatively quiet place remaining so until iron ships were built there in 1862 (see Chapter IV)

During this period very little can be discovered about the Dockyard Surgeons or their work Their appointments are recorded in the Navy List, but such journals and reports as they may have written appear to have been destroyed and there are few mentions of them in Dockyard letters

The Dockyard Surgeon's income had since 1625 been made up largely from the twopences from his patients but in 1808 this finally stopped A new code of regulations was drawn up by which the Surgeon became a Principal Officer of the Yard and Head of his own department He was no longer required to provide and pay his own assistant and they both received a substantial rise in pay — the Surgeon to £500 p.a. and his assistant to £200 p.a. At this rate they were considerably better paid than their colleagues at sea, but it seems likely also that they worked considerably harder for their remuneration their status in society was certainly higher

As a result of the lessening of Dockyard activity John White seems to have had some time on his hands for he was the subject of a complaint to the Admiralty in 1815 In some notes on Admiralty letters referred to in the Warrant Book already mentioned we read

15.9.1815 A memorial from the medical men in the neighbourhood complaining of the Surgeons of the Dockyard Marine corps and Hospital ship following private practice contrary to instructions

21.9.1815 — The Admiralty approves of the measures which have induced the Surgeon to give gratuitous advice to the Poor which it appears is all that he does

28.9.1815 — Another letter from the Apothecaries supporting their charge of Dr. White, Surgeon of the Yard, pursuing private practice.

11.10.1815 — The Surgeon is absolutely prohibited from all private practice by his instructions and no distinction as to species of practice can be admitted.

This final word was the law in the Navy until a very few years ago.

In 1833 when David Rowlands was the Surgeon a new set of Instructions for the guidance of the Principal and Inferior Officers of His Majesty's Dockyards was issued. For the Surgeon (now one of the Principal Officers) there were 24 instructions which are listed below in an abbreviated form:

1. He is to reside in the house allotted, having no night leave without permission.
2. He is to have the care of the workmen in the Dock and Rope Yards in cases of wounds and hurts only, and also of the men belonging to the vessels and mills attached to the Yard in sickness.
3. He or his assistant is to attend constantly during working hours. He is not to have serious accidents in his assistant. He is to give surgical and medical aid to men doing contract work within the Yard.
4. Men are to attend to be ministered at the Surgery at 9 a.m. Any incapable of coming in are to inform the Surgeon together with their place of residence and they are to be visited. The names of the Sick are to be entered in the Sick Book. The Sick at home are to be examined to ascertain the actual state of their health.
5. The Wounded and Hurt are to be treated at home or in the Surgery.
6. He is to take care that none remains on the list longer than necessary, such as men being recommended for easy employment.
7. He is to supply trusses to those receiving ruptures in the course of their duties.
8. He is to report any that he finds incapable of further work through injury or disease to the Superintendent for superannuation or discharge.
9. All new cases are to be examined.
10. He is to treat officers of men from ships.
11. Medicines, trusses, bedding, utensils, etc. will be supplied by and must be accounted for to the Physician of the Navy.
12. There is to be no waste or embezzlement of the above.
13. He is to provide himself with instruments and other articles in accordance with a list with which he will be provided.
14. He is to keep a Surgery Book with details of all wounded and hurt in the Yard.
15. He is to furnish the Physician of the Navy with information concerning the Medical Department including any interesting cases in a Quarterly Report. In the event of any contagious epidemic malady prevailing you are to prepare and insert in the Annual a general account of the same stating your opinion of its origin, symptoms, progress and method of cure.
16. He is to render a weekly report of those hurt and those rendered duty and a monthly full report to the Superintendent.
17. He is to place a notice in the Surgery stating that no compensation will be payable for injuries received in the Yard if the facts have not been reported to the Surgeon.
18. Printed forms will be provided.
19. Connains the procedure on succession.
20. Formal application is to be made for leave and the Surgeon is to provide a responsible surgeon as a locum.
21. Concerns the attendance of the Assistant.
22. Private practice is strictly forbidden.
23. Perquisites, fees, gratuities and rewards are forbidden.
24. Any deviation from these rules is forbidden.

Apart from the regulations to which reference has already been made this new set of orders has a number of interesting features. The persons whom he was to attend and treat and the times and places at which he should do this are more clearly stated than heretofore particular mention being made of the fact that patients sick at home are not to be treated. General Practice was now firmly established including a code of ethics regarding treating other doctors' patients and this order and the complaints against John White already mentioned show that the local practitioners were jealous of their rights.

While most of the Surgeon's requirements in the Surgery were provided it is interesting to find that he was still required to provide his own surgical instruments.

This seems to be the first time that the Surgeon was required to make quarterly reports to the Senior Medical Officer of the Navy in practice which is continued to this day. Previously the only routine reports made were to the Superintendent of the Yard with occasional reports to the Commission for the Sick and Wounded. The Dockyard Surgeons are now clearly regarded as being a part of the Naval Medical Service and thus responsible to a higher medical authority. Though epidemiology can hardly be said to have been recognised as a science the study of statistics was attracting interest. William Farr had already begun his life's work in the field and it was shortly after this time in 1836 that he was appointed as Compiler of Abstracts in the General Register Office. Farr's work was concerned mainly with births and deaths but already the Surgeon in the Dockyard was required to prepare an account of infectious disease and though his records must have been confined solely to the Dockyard and any figures he produced would have been lacking much real epidemiological significance these early studies of infectious diseases might well have been of some small use in determining their origins and mode of spread.

CHAPTER IV

1859-1865

The Medical Service in the time of William Gunn M.D.

In the years of peace in the first half of the 19th century Chatham Dockyard continued to make and to repair the wooden walls which guarded England. While there was no urgency about this work this was a time when the science of engineering expanded in an unprecedented way. Interest in its application to ship building and the use of iron instead of wood was a natural consequence. Sir Mark Brunel, whose son Isambard designed the first iron ship- the *Great Britain* (launched in 1843) had built the Saw Mills in Chatham Yard in 1810-13 and thereafter machinery was rapidly introduced the main smithery being erected in 1836. With war in Crimea interest in iron ships became intense and during this fascinating period in Naval history a doctor named William Gunn was appointed Surgeon in Chatham Yard. He was appointed on 1st July 1859 and a remarkable record of his six years in the Yard has remained in the successive surgeries of the Yard to this day. While all his official reports were destroyed the Surgery Letter Book in which he kept a copy of all letters to the Superintendent and a few others many embellished with Gunn's personal comments in the margin has survived and provides the main source of information about the medical services in the Yard in the mid-19th century.

I have not unfortunately been able to discover a portrait of Dr Gunn- but from his letters a picture of a shrewd hard working Scot emerges a man prepared to stand firmly by his high principles. He was not afraid to criticise and was prepared to speak out for what he considered right in unmistakable terms. He must have been a fine man for whom to work and various letters show his thoughtfulness for his assistants.

Dr Gunn's character emerges rapidly through his letters The second entry in the book shows his consideration

8th August 1859

Report on Henry Milton Shipwright who has lost his left leg Henry Milton Shipwright on the same disabled state as he was at the last report and never will be fit for any further duty in the Yard unless employed as he is at present in making small plugs in similar light work

Charles Dickens had often visited the Dockyard as a boy some 40 years before Dr Gunn's time as his father was employed as a clerk in the Cash Office Two years before this letter Dickens had completed Little Dorrit a story with vividly realistic scenes of another place behind a high wall where Dickens also visited his father — the debtors prison We know that life in England in the middle of the 19th century was often cruel yet Dr Gunn was obviously a man of compassion for his letter seems to be a plea to keep Henry Milton on the paytoll and usefully employed

Ten days later we see another side of Dr Gunn's character and the tough Scot begins to emerge

Chatham Dockyard
17th August, 1859

To the Captain Superintendent
Sir

I beg to represent to you how inconveniently small the present surgery is and how inadequate it is for the accommodation of the Sick and Hurt belonging to this Yard who have increased of late in proportion to the increase in the number of men employed amounting now to 3,000 Its situation is also most inconvenient, being placed in a corner of the Yard so that men meeting with accidents when at work have to be taken some distance to the Surgery and then carried back again before they can be passed out of the Yard

The receiving room is so remarkably small that it cannot accommodate one third of the Sick and Hurt, and is intolerably hot during the summer from the roof being flat and covered with lead and from the presence of a fire which is constantly required for keeping the surgery supplied with hot water

There is no proper place for the examination of newly raised men of whom upwards of 1,500 have been entered during the last twelve months — indeed this duty always a disagreeable one has become of late much more so from the want of proper accommodation

The room where the medicines are kept is likewise too small and very damp from being built against the adjoining terrace

There is no bathroom attached to the Surgery

I am therefore to request that you will move my Lords Commissioners of the Admiralty that they may be pleased to sanction the erection of another Surgery in some more convenient situation in the Yard

I have the honour to be etc etc

William Gunn M D
Staff Surgeon

This letter shows a number of interesting features Dr Gunn had obviously thought hard in his first six weeks in the Yard and had definite ideas on what a Dockyard Surgery should be like Firstly it must be placed in a central and convenient part of the Yard if optimum use of its facilities is to be made When this Surgery had first been used for that function in 1711 it was so placed but by 1859 the Yard had expanded considerably to the north and the Surgery was now tucked away far from the main area of work Secondly the building must be suited to the numbers using it When the Surgery was opened in 1711 there were 1 200 or so employees in the Yard and this number fell sharply so that in 1714 there were only 860 During the 18th century numbers were mostly fairly small but they increased again during the Napoleonic Wars then dropped again until this

sharp rise in Dr Cuffe's time. At this period Britain was building up her Navy into what was soon to become the greatest single power at sea the world has ever known and to keep the large number of men employed in this massive operation in a healthy state Dr Gunn was well aware that adequate facilities were essential.

At the time when Gunn was writing Lister was working on antisepsis and Pasteur had yet to make his momentous discoveries but Gunn obviously had good ideas on cleanliness judging from his comments about ventilation hot water and the need for a bathroom.

The 'room where the medicines are kept' is still there today and from the appearance of the key in the door I would think Dr Gunn often used this same key to take his medicines and his leeches from the damp cupboard which is now a store for cleaning equipment. I searched in vain amongst the debris for some sign of the place's use as a medical store for 150 years.

Dr Gunn's plea for a new surgery did not go very far for alongside his letter there is a note in red ink:

> Memo: Capt. Goldsmith [the Captain Superintendent] put this letter in his desk — it was never forwarded to Admiralty nor did he submit it to the Board during their visits to the Yard in 1859 and 1860 — he merely directed the Clerk of the Works to prepare a plan of the proposed Surgery which he did — this was also placed in his desk with my letter W G

Dr Gunn's work was not helped by the sickness of his assistant Dr Peacock who was placed on the Sick List on 19th August 1859:

> he has suffered from an affection of the spleen haemorrhoids and latterly from symptoms of pulmonary disease there is also a loss of appetite great derangement of the digestive organs debility and excessive nervous irritability

A letter a year later confirms that he had malaria which was endemic in the area until early in the 20th century. He was given three months Sick Leave that August and was never really fit again being invalided in November 1860 with a generous pension of £146 per annum plus so a note in Dr Gunn's hand states six shillings a day half pay a total of £255 10s 0d per annum or rather more than he had received as Assistant Surgeon in the Dockyard.

The Surgery letters do not include full nosological returns and it was only those who were admitted to hospital who were the subject of letters to the Captain Superintendent. This is still true today.

I attempted to analyse the reports of those sent to the hospital after being injured on duty but so few details are given that little of value can be learned. In the first three years of Dr Gunn's tenure of office 71 injured men were sent to hospital of whom six are reported as having died. Shipwrights and labourers made up 50 of the number admitted but it is likely that these formed a large percentage of the numbers in the Yard. Many of their injuries were caused in falls on board ships or into docks.

An interesting injury which will be mentioned again later is that caused by an adze. This tool was constantly used by shipwrights before the plane was invented and it may be significant that there were ten injuries to the left leg and only four to the right during this period and as half of each of these injuries were sustained by shipwrights it is likely that the adze was responsible. The left leg would be more likely to be injured by a right-handed worker with this tool.

Another injury is of particular interest for on 11th June 1862 a riveter received severe injuries when at work on board HMS *Achilles* which was the first iron ship to be built at Chatham and this is the first time the word 'riveter' is mentioned. Work on the *Achilles* had been started at the beginning of 1862 and the change in the nature of injuries being treated in the Dockyard Surgery was noted by Dr Gunn.

In 1863 Dr Gunn wrote a long letter to the Admiralty concerning his duties and an amended copy of this letter was sent in August 1864 to the Medical Director General of the Navy Dr Bryson. It reads as follows:

Dear Sir

In compliance with your directions I beg to transmit a statement of our daily and other duties here which have increased very much of late owing to the recent change in the nature of the Dockyard work and the great increase in the numbers of men employed.

Since the commencement of iron ship building in this Yard nearly three years since the entries increased at the rate of 100 per month until they reached their present number namely 4 000.

The working hours of the Yard now are and have been for some time past from 6 a.m. until 9 or 10 p.m. with the exception of half an hour allowed for dinner to the men employed on the iron ships but we cannot reckon up in that short time as accidents occurring on board the *Achilles* in Gillingham Reach are brought to us at any moment. The Surgery is kept open during the whole of that time with the messenger in attendance and one of the Medical Officers must always be on the spot from morning till night in case of accidents. The men in the Metal Mills work five nights in the week and they are very liable to accidents from the peculiar nature of their duty. Accidents have not only increased in number of late but they have also differed a good deal in character since the substitution of iron for wood in shipbuilding. In addition to the old axe and adze wounds contusions, lacerated and punctured wounds and burns (the latter often very severe) particularly of the head hands feet face and eyes are now very common loss of eyesight frequently resulting therefrom.

By the use of new tools the men are subject to injuries of the palms of the hands causing inflammation ending often in deep-seated abscesses. Deafness is also met with owing to the incessant noise attending the new kind of work — this is most remarkable amongst the boilermakers — still I do not think there are more serious accidents now than formerly those severe mangled wounds inflicted by the adze and axe are not now met with.

It will be seen by the nosological returns that the number of sick and hurt men absent from duty seldom exceeds 3 per cent. This gives a very imperfect idea of the actual number requiring medical and surgical assistance that some under our notice the fresh accidents alone occurring daily amount to between 25 and 30 — of course the great majority of these are trifling the men returning to their work after being properly attended to. Ill unable to do so owing to hurts and sickness they are sent to their homes.

It is always the custom for the hurt and sick men to attend at the Surgery every morning at 9 o'clock. The working men with hurts are first seen then the hurt men who are absent from duty and who receive half their pay during sick absence (this requires great vigilance to prevent the abuse of it) and lastly the sick are attended to. This occupies one to two hours according to the number present amounting every morning to sixty to seventy and often to one hundred.

When the principal part of the morning's work is finished the Assistant Surgeon leaves the Yard for the purposes of visiting at their homes the sick and hurt men who do not attend at the Surgery. This takes some time and is a work of considerable labour as the neighbourhood is very extensive and the men's residences often situated in nearly opposite directions, miles apart.

Examining men for entry is certainly from having no proper place for doing so, the most unpleasant duty we have to perform. During 1862 upwards of 1 550 were examined. Having only one working room for everything men with injuries are obliged to remain at the door waiting whilst the newly raised men are undergoing the necessary medical examinations inside.

There are eighteen resident families in the Yard frequently requiring our services.

In consequence of this being the only Yard in which iron ship building has been introduced the duties of the Medical Officers have very much increased of late. An Assistant Surgeon lent from the *Cumberland* does duty on board the *Achilles* lying two miles down the river — he lives in one of the hulks close by. The contractors men employed in the Yard also receive medical assistance from us.

The following books are kept by us namely

1 A Surgery Book in which every accident however trifling is entered by the messenger at once
2 A Daily Record and Visiting Book
3 A Sick Book } Corrected every morning and then sent to the Accountants and Audit office
4 A Hurt Book }
5 A Sick Book } A copy of the above kept in the Surgery as a record
6 A Hurt Book }
7 A Prescription Book — for the resident families
8 A Case Book
9 A Letter Book which also contains a copy of every Report made to the Superintendent etc
10 A Nosological Return Book

I remain dear Sir
Yours very respectfully
Wm Gunn M D
Staff Surgeon

The medical services in the Dockyard had obviously reached a high standard of efficiency — at least in theory — for this period Dr Gunn seems to have appreciated the fundamental principles of Industrial Medicine as far as was possible at that time and was running an organisation which attempted to look after the working population to a high degree Unfortunately there are no records to tell us whether the fact matched up to the theory but it seems likely that to a great extent this was so from Dr Gunn's obvious attention to detail

Firstly there comes through the lines of this letter the fact that the Staff Surgeon must have spent some time out in the Yard The introduction of new methods and tools into the Yard had made its impact upon the medical branch and Dr Gunn appears to have shown a greater interest in this than would a man who spent his day in the Surgery He makes no mention of this and it is a matter of conjecture just how much time he spent seeing the new methods in action

Next we find an obvious appreciation of the necessity to keep proper records It is only in fairly recent times that adequate use is being made of good records in Industrial Medicine generally and it seems likely that much of Dr Gunn's work in this respect was wasted Certainly we have no record of any attempt being made to analyse the results and turn them to any advantage More will be said later concerning this but it is not surprising that no mention is made of work being done to prevent accidents or disease if no analysis of the records was undertaken

It is of interest to note that the Navy felt some responsibility to the Dockyard employees while they were out of the Yard Men put on the Hurt List received half pay for six months and were then usually invalided with a gratuity There is mention in another letter in September 1861 of a hired smith who had received severe and permanent injuries of the left foot six months previously resulting apparently in osteomyelitis He was receiving 12 shillings half pay from the Yard as well as 14 shillings from the Foresters Club — in fact he was better off than when he was working It seems likely that in return for continuing payment — most uncommon at that time — the Yard was able to keep some control by sending the doctor to visit the Sick and Hurt at their homes which was mutually advantageous We read elsewhere that a man was not visited as he resides four miles from the Dockyard double the distance limited by the Admiralty but most of the employees would have lived within two miles Dr Gunn was well

aware of the necessity to keep these men on the Sick List under observation and this becomes apparent in a letter mentioned below

The most notable omission from the Medical Officer's duties in the mid 19th century compared with today is that he seems to have shown little interest in preventive medicine Apart from examining all new entries into the Dockyard no measures appear to have been taken which might have tended to lessen the number of accidents or disease to those working in the Yard There was no Safety Officer at that time and the work of the Medical Department seems to have been aimed at treatment and cure rather than prevention

However Dr Gunn was obviously kept busy The examination of 1,550 new entries in the year 1862 was exceptional This was a result of the change-over to building with iron There was no sign of new accommodation for the Medical Department and one must sympathise with Dr Gunn in his most unpleasant work in the cramped quarters of the old Surgery

There is little recorded about the Surgeon's visits to the houses of Dockyard workers but on 5th October 1864 Dr Gunn visited a sawyer named Tillman who had been attending the Surgery every week and did not expect to be visited by me at his home Dr Gunn reports that he had been on the Sick List since 31st August and in the front part of his residence there is a Butcher's shop marked with his name In passing through this shop I found Tillman in a room behind with a Butcher's dress on smoking a pipe He had all the appearance of having been very recently employed in killing or cutting meat Gunn goes on to say that there was no evidence of Tillman being a sufferer he had not consulted a doctor as advised and that he was making a convenience of the Sick List The Captain Superintendent of the Yard agreed and Tillman was discharged shortly after Dr Gunn's unexpected call

Such was the pressure of work arising from the ironship *Achilles* that Dr Gunn asked for and was sent an Assistant Surgeon to work on board this ship after she was launched in December 1863 She was taken downstream two miles and over 1,000 dockyard men continued to work on board fitting out. A Mr Benjamin Browning was the Surgeon appointed and his zeal was much to Dr Gunn's satisfaction according to a certificate he was given on leaving nine months later During that time seven men are recorded as being sent to hospital with serious injuries and another four as killed in accidents on board

There is very little mention in Dr Gunn's letters of the Staff employed in the Surgery Nursing as a profession was in its infancy and no systematic training was available outside the London Teaching Hospitals Indeed it was many years before men were trained in nursing techniques and the Staff of the Surgery in the mid 19th century would almost certainly have been ordinary labourers who must have learned what they could from the Surgeons in the Yard The only member of the Staff other than the doctors mentioned by Dr Gunn is the Surgery Messenger Samuel Martin occupied this post for over 24 years before his retirement early in 1861 at which time he had served in the Dockyard for 46 years and 11 months He had been paid 3s 6d per day for seven days a week when he retired a total of £63 17s 0d per annum and received a pension of £42 11s 8d

[illegible] [illegible] did not leave the family [illegible] for his son William [illegible] His duties were obviously not merely [illegible] messages for he was required [illegible] in attendance in case of accidents until 10 pm

We are not told the arrangements for the transport of the injured but some sort of ambulance was in use from 1856 for Dr Gunn mentions 'the spring carriage used by us for the conveyance of the Hurt and Sick' manufactured in this yard in 1856 at a cost of £7 5s 6d He goes on to talk of a better one made in London and used in the Woolwich Yard

It was presumably on this carriage that injured men were conveyed when necessary to hospital The Melville Hospital (named after the First Sea Lord of the time) was opened in 1827 being most conveniently situated not far from the main gate of the dockyard and having succeeded the Royal Marine Infirmary It was used by the Army and Navy as well as the Dockyard but civilians from the latter were entitled to treatment only when hurt In a letter to the Medical Director General of the Navy in October 1861 Dr Gunn states

'that men with Hurts are always sent to hospital when necessary and so long as their names are retained on the Hurt List they receive the like of their pay whether in the Hospital or not but as in general rule none of the Dockyard men with the exception of those belonging to the Yard Craft are ever sent to the Hospital when sick By a recent order the Metropolitan Police are admitted into Hospital when sick'

The proximity of the hospital made a great difference to the treatment of the injured Owned and run by Service personnel there were no problems about admitting patients as there may have been in civilian hospitals and the standards in Service hospitals in the treatment of wounds and injuries were probably as high as anywhere and higher than most The rapidity with which patients could be removed to hospital continued to make a considerable difference to the efficiency of the medical services in the dockyard until the second Royal Naval Hospital was transferred to the Ministry of Health in January 1961

Services for the rehabilitation of those handicapped through injury were but few during Dr Gunn's time but he made some efforts in this field Trusses had for many years been provided for those suffering hernias not merely for their convenience but with the intention of enabling the men to return to work as is shown in another letter referring mainly to an unsuccessful petition for payment of the expenses of two men each of whom had lost an eye when working in the Yard

'they had permission to attend the Ophthalmic Hospital at Middlesex and their doing so caused them considerable expense Half pay was granted during their time on the Hurt List A glass eye though of no use in the wearer does certainly improve his appearance — in the case of a ruptured it is difficult a truss is supplied to enable the individual to continue at his work and prevent the rupture getting larger'

Another prosthesis was supplied to John King a shipwright apprentice who was injured in May 1860 when aged 15 He received a wound of the right leg He was thirteen months on the Hurt List eventually returning with a severely contracted limb and in 1863 he had to go into the London Hospital for an operation on it In February that year Dr Gunn writes

'it has always been customary to supply workmen who have lost a leg in the Service with the required mechanical appliance and as I consider this lad's injury equal to the loss of a limb if the leg had remained in its contracted state (and for the removal of which this instrument was initially necessary) he seems to be fairly entitled to the same indulgence.

The Surgeon of the Yard has no means of supplying mechanical appliances of this kind — they are specially made and fitted for each case by a London Instrument maker and paid for by their Lordship's Authority

Dr Gunn's plea was successful their Lordships allowing the four guineas cost of the instrument to be paid by the Admiralty

Some of Dr Guun's duties were very much public health work On occasion he was required to examine residences in the Dockyard for their fitness for habitation and he leaves a record of visits to one such home and to the police cells

29th May 1862

To the Captain Superintendent

Sir

I beg to report that Scarlet Fever has recently appeared in the family of the Boatswain of the Yard in a very malignant form causing the death of two of his children Mr Beeman's residence is, in my opinion very prejudicial to health in its present state The house is very old and its lower part so damp that the woodwork next to the walls has become much decayed and its inner surface covered with fungus In addition to which the house is very imperfectly ventilated having dark closets and no windows to admit air or light excepting on one side — indeed a ray of sunshine never enters the dwelling

I beg to recommend in order to prevent the spread of disease and further fatal consequences that Mr Beeman's residence should be put in proper condition which can only be done by the immediate removal of the family from it

Knowledge of bacteriology and epidemiology in 1862 was slight but again we have evidence of Dr Guun's appreciation of the effect of poor environmental conditions upon health While he probably knew nothing of bacteria he obviously knew of the value of light sunshine and ventilation in the control of infectious disease

A year later Dr Guun found the police cells to be in a similar damp and ill ventilated state and made several recommendations for their improvement Whether anything was done seems very doubtful for the cells now used as stores are in exactly the same state today though something must have been done to reduce the dampness which was coming through the wall

There are many references in Dr Gunn's letters to the effects of the climate in the Medway area and he reports several cases of malaria in this damp and aguish locality' He asked for Sick Leave for several patients with rheumatism saying that removal from the banks of the Medway to a milder and drier locality' would benefit their health Bronchitis was not a diagnosis which would have been made in Dr Gunn's time but today it causes more days work to be lost than any other single disease in Chatham Dockyard the dampness of the area being just as bad now as then

As noted earlier the Surgeon was required to report cases of particular interest to the Medical Director-General and he refers in his letters to four painters suffering from lead poisoning or painters colic Two of them died and their widows received gratuities It is of special interest to note that men suffering from this disease were placed on the Hurt List not the Sick List and therefore that the aetiology of the disease was quite clearly acknowledged as being occupational Those on the Hurt List received half-pay for six months while those on the Sick List were paid nothing by the Yard though various clubs existed on a voluntary basis to ensure that the prudent were not left destitute by sickness

One of the more unusual injuries recorded is that to Thomas Rudd a spinner in the Ropeyard who

received a severe injury on the left side of the chest, over the region of the heart by being crushed when the men were hurrying through the minster station on the eve of the holiday granted on the marriage of the Prince of Wales and I am of the opinion that the injury then received caused heart disease of which he died after very severe and prolonged suffering on the 4th inst

As the future King Edward VII was married on 10th March 1863, and Rudd died on 4th March, 1864 his suffering was indeed prolonged In this case we have another example of the Admiralty's generosity to an employee Rudd's injuries were not caused directly by his work but as they occurred (just) inside the Dockyard Gate some liability was accepted by the Admiralty in an era when employers generally were almost brutally harsh in their treatment of employees and Rudd's widow was paid a pension of £12 per annum

There is much more of interest in the Letter-Book from which I have quoted leaving us with a picture of an Occupational Health Service of unusual sophistication for its day controlled by a hard working intelligent Scot but Dr Gunn eventually had to leave The following letter from the Secretary of the Admiralty dated 13th July 1865 was sent to Captain Stewart the Captain Superintendent of the Dockyard

Sir

I am commanded by my Lords Commissioners of the Admiralty to inform you that Dr William Gunn Staff Surgeon of Chatham Dockyard having attained the age of sixty years has this day been placed on the Retired List of Medical Officers and granted the honorary rank of Deputy Inspector General of Officers and Fleets

Dr Gunn was formally relieved by Staff Surgeon John King on 2nd August 1865 but appears to have had a month's grace before leaving his residence Number 9 The Terrace for he writes his last letter on 3rd September This is a testimonial for his Assistant, but makes a fitting memorial for Dr Gunn himself

Before quitting the Dockyard I wish to put on record the high opinion I entertain of the professional skill and ability of Dr J R Holman the Assisting Surgeon and to bear testimony to the very efficient and satisfactory manner in which he at all times performed with zeal and energy his various duties which of late years, particularly since the introduction of iron in ship building have been as the records of this office will show most onerous especially that of visiting the Sick and Hurt at their residences which in this scattered and extensive neighbourhood is a work of great labour

While kind and humane to those who deserved sympathy and required medical aid Dr Holman was always watchful to prevent the fraudulent detention of men on the Sick and Hurt Lists

With cheerfulness and willingness he always felt anxious to make the duties of the Yard as light and agreeable to me as possible — for this and for many acts of considerate kindness I feel much indebted and willingly bear testimony thereto

Wm Gunn M D
Staff Surgeon

CHAPTER V

1866-1948

An Organised Medical Service

The late 1860s were a time of great change in the dockyard The great increase in work following the building of iron ships made expansion of the Yard essential but the only direction in which this was possible was to the north which was an area of marsh Beyond Saint Mary's Creek lay Saint Mary's Island an area of

swamp which favoured the continued endemicity of malaria. In 1854 this island was purchased by the Admiralty and the plans of 1864 show much of this area under reclamation. A wall was built around much of the Island, using labour provided by the Convict Prison which was erected at about the same time to the north east of the Yard in the area now occupied by Naval Barracks. On the land which had been drained a brickfield was started in 1865 and this provided materials for the work on the Basins which were constructed where Saint Mary's Creek had been. Number One Basin to the west was opened in 1871 and by 1883 the three basins were in use and buildings were springing up around them. With these great changes the Yard took on an altogether different shape both physically and functionally for the main work in the Yard was and has been ever since concentrated around these new basins, though building and repairs still take place in the old ships and docks along the west side of the Dockyard.

Dr. Gunn had complained bitterly about the old Surgery (see page 42). In 1859 he was conscious that the Surgery was 'most inconvenient being placed in a corner of the Yard and throughout his time there he had campaigned for a new, more central building. Soon after his retirement a new purpose built Surgery was erected. Far larger and better designed than the last, it is a pity that it was constructed only about two hundred yards north of the old Surgery for by that time the work on the new Yard was well advanced. However Dr. Gunn had assisted in drawing up the plans for the new building and had presumably approved the site for work was begun in about 1867 and after over 150 years the old Surgery was left at last. It is still there (Plate III), its flat lead lined roof, of which Dr. Gunn complained, replaced by tiles and is used as a recreation club for Dockyard Officers.

The number of employees in the Yard continued to increase after Dr. Gunn's departure and a new problem was presented to his successors when, in 1866, women were first employed in the Yard. This became necessary because for the first time in the history of the Yard there was a shortage of labour and ever since that time there have been women employed in the old Ropery. This building deserves some special mention for it is now unique in this country and possibly the world. Built in 1719 it is a four storey building, very much the same today as when it was constructed, and though machinery was introduced in the nineteenth century and electricity in the twentieth century the methods of forming and laying ropes have altered very little throughout the history of the building which to enable the laying of ropes of adequate length is nearly a quarter of a mile long. The introduction of man made fibres has made the requirements for manila and sisal rope a tiny fraction of what they were and the Ropery at Chatham is the only one it is believed that still serves its original purpose. While its function may have its roots in antiquity modern medicine has not allowed the Ropery to ignore the passage of time and an interesting inquiry was carried out in the building into the effects of dust on rope workers (Munt *et al* 1965).

It has already been noted that Medical Officers were not Commissioned Officers of the Royal Navy until 1843. Before that time the Surgeons in Chatham

Dockyard had served on a permanent basis and many had worked there for more than twenty years From 1843 until Dr Gunn's retirement the Surgeon's appointment in the Yard was for a period of four to six years Ever since then no Medical Officer has worked in the Yard for longer than three years except during the Second World War As we have seen Dr Gunn maintained close contact with his superiors in London and with increasing ease of communication the department of the Medical Director General was far more in control of the medical services of the Dockyard than had been the case for the first two hundred years of its history With short appointments and greater supervision the Dockyard Medical Officers were much less able to stamp their own personality upon the Yard and introduce their own ideas and this remains true today

Very few records remain of the work in the Department before the First World War In order to rationalise the records system at the Admiralty it was decided to destroy all records more than fifty years old except those of public interest There are therefore none of the Medical Officers Quarterly Journals written before 1914 to examine except for a large volume of duplicates covering the period 1883 1893 which somehow survived along with Dr Gunn's Letter Book in the Surgery at Chatham

These reports show primarily a complicated statistical return for the Sickness absence in the Yard though there is no evidence to show whether these proved of any value for the destruction of records in the Admiralty means it is not possible to find out what use was made of the Dockyard Surgeon's compilations Apart from these tables which will be described later there is a list of the average numbers in the Yard of those employed in the Yard who had died during the preceding three months and those who had been sent to hospital or issued with trusses during the same quarter and the report ended with some remarks by the Surgeon

The method of duplication of the Sickness absence tables has caused many of the main headings to be omitted but in several of the tables these have been pencilled in and it is possible to see how they were compiled The horizontal rows are divided into thirteen general headings for diseases each subdivided into individual diagnoses and two rows one for wounds and injuries also subdivided and one for debility The general headings are numbered I XIII and I have used various quarterly records to show these headings and examples of the diseases included under them which are shown in Appendix B The vertical columns show for each individual diagnosis the number remaining on the Sick and Hurt lists from the previous return the number added to these lists during the current quarter the number returned to duty the number sent to hospital the number who died and those invalided and the number remaining on the lists at the end of the quarter These numbers are then broken down to show the cases arranged according to different age groups the groupings used being 15 25 25 35 35 45 45 55 and 55 65 There are then two final columns showing the total number of new cases under each diagnosis during the quarter and the number of days sickness incurred by these cases

There seems, unfortunately to be a basic error in these tables which makes

it impossible to gain an accurate picture of the average duration of a period of sickness for any particular diagnosis for the number of days sickness and the number of cases in the final columns usually refer only to the new cases occurring and the number of days sickness suffered by those who were still sick at the end of the quarter does not seem to be taken into account.

At the end of the year a table referred to as the Statistical Abstract was prepared but, presumably due to the anomaly already referred to it is not possible to tally these figures with the quarterly returns. The figures from a complete Statistical Abstract are given in Appendix C and a summary of the Abstracts for 1886-92 inclusive which are all those included in the Journals in Appendix D.

The remarks of the Surgeons during this period vary considerably in length style and content. Sometimes the Surgeon contents himself with a few brief general comments and sometimes he works his way through the classified diseases with notes on each section. Sometimes he makes bold statements of fact and occasionally he offers some constructive suggestions. Frequently he summarises any interesting cases which have occurred but detailed accounts of these seem to have been sent separately. It seems to have been usual to compare the quarter with the previous one, especially if the comparison were favourable but rarely was an attempt made to compare with the same quarter of previous years. From these remarks we find that men were frequently sent on compulsory leave during a period of quarantine for an infectious disease but no mention of these days lost is made in the Statistical Tables.

In order to give some indication of the type of general remarks made, I give below two examples. Quarter ending 30th September 1883.

'There is a slight reduction in the number of days lost on the Sick and Hort lists compared with the last quarter, ending 30th June, after making allowance for nearly a hundred men disbanded during this period.

Zymotic diseases appear to have been less prevalent. Thirteen persons were absent on compulsory leave owing to the presence of small pox and scarlatina at their homes — two of the former and eleven of the latter.

Twelve hundred and ninety two cases of minor injury, were treated at the Surgery being an increase of two hundred and four over the preceding quarter.

This may in some measure be accounted for by the resumption of overtime work.

In General Disease Section A [See Appendix B] a case of measles commencing (Mr. Twigg, Surgeon) was returned to duty, one of small pox was added and four returned to duty, one of enteric fever was added and (with one previously entered) still remains. There were only two admissions for ague, both occurring in elderly persons previously subject to this disease. There were three admissions for very mild attacks of mysipelas.

II. In Section B there are forty nine admissions for rheumatism in various forms and five for gout. Five persons were admitted for phthisis (including one remaining under the last return under the head of bronchitis) three of whom died.

III. Two fatal cases of apoplexy, occurred one (person) in a boy named Hook employed in the Coppersmiths shop. The other a man aged 45.

IV. Circulatory system. A case of Haemopiyesis mentioned with cardiac disease and remaining by last return was discharged to duty.

VII. Respiratory System. In this class, there is a very material diminution compared with last quarter. The admissions are sixty three against one hundred and forty-three and the days sickness eight hundred and sixty four against two thousand five hundred and thirty four. This difference is I think easily accounted for by the warm and genial summer.

VIII. Digestive System. Diarrhoea and other ailments of the digestive system to a great extent replaced those of the respiratory system. In addition to the fifty one cases entered on the Sick list there were numerous applications daily at the Surgery particularly during the months of August and September when many persons were apprehensive of the advent of cholera from Egypt. Most of these cases were cured with one or at most two doses of medicine. Dyspepsia is likely to continue a common complaint as long as the present system

and harrowing manner It being meals maintains among Dockyard employees, which is bad under ordinary circumstances and worse while working overtime

Poisons Three were only slaven returns for lead poisoning during the quarter and they were taken at an early stage These cases are diminishing in frequency and severity by greater attention being paid to their prevention

Wounds and Injuries There are two hundred and fifteen admissions (nearly all on the Hurt List) for various forms of injury Two deaths occurred from violence viz R Thomas an 19 boy fractured skull by falling into a dry dock and E G Hall ant. 58 a fitter whose chest was crushed by the toppling of a large iron wheel They both died shortly after removal to hospital and three cases were specially reported

James Thomson
Fleet Surgeon

From the statistical returns for this quarter we find that there were 75 cases remaining on the Sick and Hurt Lists from the previous quarter and 578 new cases were added Of these 484 were returned to duty 16 were sent to hospital 8 died 5 were invalided and 80 remained on the List I would have expected those sent to hospital to be included amongst those remaining on the List but this was not so The total of 593 cases incurred 9 555 days of sickness during the quarter but as has been mentioned already the habit of taking the quarter as a whole unit and not the cases beginning or ending in the quarter makes it impossible to determine the average duration of spells of sickness We are however given the total numbers working in the Yard though not how this figure of 5 317 is arrived at If this can be accepted as a reasonable figure for the population at risk we have an average number of days sickness per 1 000 employees at risk of 1 779 though this figure was not worked out in the returns Unfortunately these figures are not strictly comparable with those recorded today on which comment is made in a later chapter

There are many features even of this one report which are interesting, but no real benefit would be gained by additional comment except perhaps to the heading for poisons Lead poisoning had long been recognised as we have seen in Dr Gunn's reports and it may seem surprising to find eleven cases still occurring in a quarter and considered acceptable In the returns it is noted that these eleven cases incurred a total of 169 days sickness between them

Another report by the same Surgeon that for the quarter ending 30th September 1885 is of a different type

The report for the past quarter may I think be favourably compared even with the last, which showed a less amount of sickness, accident etc than hitherto The numbers borne have been still further increased but the casualties have been fewer

Only three persons have been placed on compulsory sick leave during the quarter On infectious disease occurring in their respective homes Several cases of measles occurred in the Married Police Quarters outside the Dockyard (among the children) but the threatened epidemics have now disappeared

There were thirteen hundred and sixty cases of minor injury attended to at the surgery in addition to those shown in the returns As usual a large number of these were accidents to the eye which would naturally suggest that means and an electric magnet should be allowed for the proper treatment of such cases as they occur and on the spot instead of sometimes being sent elsewhere

James Thomson
Fleet Surgeon

This was one of the few reports containing some constructive criticism but what became of these suggestions we are not told. It is of interest to note in both these reports the remarks on infectious diseases a section which scarcely affects the Sickness-Absence in the Dockyard today

At the end of the nineteenth century there was a sophisticated organisation for the medical care of Dockyard Personnel firmly established and running smoothly if in a somewhat slow Victorian fashion There had in fact been but few changes in the department in the previous fifty years though there must have been some increase in efficiency for larger numbers (over 6 000 in 1892) were now being cared for Communications and transport systems would certainly account for some speeding up of the organisation and there had also been some increase in staff though the number of doctors remained the same

Early in the twentieth century the use of electricity made the first major change in the pattern of ship building since the introduction of iron and an Electrical Engineering Department was formed at Chatham in 1903 This must have brought new medical problems but we have no records of them The massive build-up of the Royal Navy and the full implementation of the new facilities at Chatham meant that the Dockyard was very busy up to and including the First World War when the British Navy was the most powerful fleet the world had known It included submarines and Chatham began the long tradition which continues to this day of building these vessels when the C 17 was launched in 1908

Throughout the first half of the twentieth century the Yard has continued to alter according to the changing pattern of ships With these alterations the Medical Department has had to make some changes but throughout this period these were very few and the system of operating and even the records and reports show little variation from those to which reference has been made During the Second World War there were 13 000 people including 2 000 women normally employed in the Yard One-thousand-three hundred and-sixty ships were repaired and 10 submarines one cruiser and 6 other vessels were built The dockyard was naturally a target for German bombers and 92 high explosive and innumerable incendiary bombs hit the Yard killing 15 people and wounding 107 All this put considerable strain on the Medical Services of the Yard which were under the charge throughout the war of a single Senior Medical Officer Surgeon Commander F M Rivaz R N

In the first half of the twentieth century although the Medical Services were strained to the limit by two world wars the changes in these services were more in detail than in policy or major action The Royal Naval Hospital Chatham formally opened by H M King Edward VII on 26th July 1905 had stood as the second line of defence throughout this time and it was not until the introduction of the National Health Service in 1948 that radical changes were made in the Dockyard Medical Services

CHAPTER VI

1948 - 1966

The Medical Services Today

At the time of the implementation of the National Health Service Act in 1948 the three main bases for Naval personnel were centred on Portsmouth Plymouth and Chatham Each of these main ports also had large dockyards and a Royal Naval Hospital and consultant services were available not only to members of the Armed Forces but also for dockyard personnel In theory the latter were

treated in the Naval Hospitals for medical or surgical conditions arising only out of their work but in practice full advantage was taken of the proximity of the hospitals to the mutual advantage of employer and employees in the dockyards.

The hospitals geared as they were for wartime conditions were comparatively better staffed than the civilian hospitals and it was possible to obtain early out patient appointments and admissions for patients from the dockyard which meant that those requiring hospital treatment lost less time away from work or on restricted duties. Radiography physiotherapy ophthalmology and pathology and other services were all available only a few minutes from the Yard which was thus able to provide an almost complete medical service for its employees though these had of course their own private general practitioners as had been the case for many years. Relations between general practitioners the hospital and the dockyard were very close many general practitioners in the area being honorary members of the Medical Mess in the hospital.

When the Welfare State provided free medical care for all it was no longer economically sound for the Admiralty to maintain three Naval hospitals. The smallest and newest at Chatham was the obvious one to go as in the late 1950s it was decided to close the Naval Barracks and the other dockyard in the area at Sheerness also ceased to function as a Royal Yard. As a result on January 15 1961 the Royal Naval Hospital Chatham was transferred to the Ministry of Health (Lloyd and Coulter 1963a).

Other changes were afoot within the dockyard itself. As in 1832 there was considered to be a need for new administrative procedures in the management of the dockyards. We have seen how those affected the Medical Department in the new orders issued in 1833 when the Surgeon became a Principal Officer of the Yard. When the later re organisation was planned it was decided that the alterations to the management structure should take place in stages at Chatham as a pilot scheme and this started in 1956 and was completed by the end of 1962. A General Manager was introduced who had charge of Planning Production Finance Personnel and Yard Services departments the Admiral Superintendent occupying the position equivalent to the Chairman of a civil company with direct control of some of the ancillary departments including the Medical Department.

The position of the Medical Department was subject to some debate as it was felt by some that it would be easier administratively if the Senior Medical Officer were directly responsible to the Personnel Manager. It was considered however that this would hinder the Senior Medical Officer from having direct access to the top echelons of management and that the neutral position of the Medical Department between management and employees might be endangered. These two important principles were quite rightly regarded as outweighing any advantage of administrative tidiness and the Senior Medical Officer remained and still is head of his own department and responsible directly to the Admiral Superintendant and to the Medical Director-General (Naval).

Although the Royal Naval Barracks had ceased to exist as a depot the buildings remain and Chatham now forms the headquarters of all training for the Supply Department of the Royal Navy. As a result the Naval Messes were as

fully occupied shortly after the closure of the Barracks as before. Apart from the considerable numbers of officers and ratings attending courses there are always several ships in port so the necessity to maintain an adequate Naval Sick Quarters remains. With the closure of the hospital the Sick Quarters were enlarged and improved and some facilities such as the taking and examination of blood films and the Mass Miniature Radiography Unit which had been in the hospital were transferred to the Sick Quarters and are available for the dockyard medical officers to use.

Within the dockyard further building and the alteration of the management structure meant that even more of the work was being centred around Numbers One and Two basins. The position of the Dockyard Surgery was inconvenient for the needs of men at the other end of the Yard and a First-Aid Post, manned by one of the Surgery Assistants was being used by the Medical Department to prevent unnecessary waste of time, but this was not an altogether satisfactory arrangement as supervision was not easy and the maintenance of two buildings was uneconomical.

The management alterations had led to the building of new office blocks within the Yard and a block built in 1881 for the Engineering Department became vacant. Situated geographically close to the centre of the Yard, an island where three main roads converge, and close to the Pembroke Gate of the Yard, it seemed eminently suitable for a new Medical Centre and, at a cost of about £5,000, was converted to this end (Plate V). It was opened by the Medical Director-General of the Navy in September 1962. The old Surgery which had served so well for 95 years was itself converted, though not until 1966, into an office for secretarial staff.

Before this move to the new centre important changes had taken place within the Medical Department in the keeping and filing of records. Since Staff Surgeon Gunn had listed the Record Books in use in 1863, there had been remarkably little alteration in the system of noting matters relating to the Department and in 1958 the Senior Medical Officer, Surgeon Commander A. W. W. Robinson and the Senior Surgery Assistant, Mr. R. Adam, undertook an entire revision of the whole system. Until then Sick Absences had been recorded in a Sick Book, of which about four were used annually in the Yard. A separate entry was made in an Index Book at the same time. To examine a man's Sick Record thus necessitated a search of all Index and Sick Books and in cases of claims for compensation, when it was sometimes necessary to look back for 25 or more years, this operation could involve the expenditure of as much as 40 man-hours. This was, to say the least, a cumbersome procedure.

The re-organisation of the records system took over six months to complete but was well worthwhile as it is now possible to produce a Sick Record for such a compensation claim in about two minutes. An Accident Card is kept in the Casualty Department, a Medical Record Card is kept in the Sick Office and a file containing all other data (hospital notes, sick extension letters, compensation examinations etc.) is in the Main Records Office, and in these three places every relevant medical detail of any industrial employee from the time he enters the

Plate V The Medical Centre, Chatham

Yard can be found. Records of those who leave the Yard temporarily or permanently are kept in a separate office, the "Dead Records Office", until the employee is of an age when the notes are considered to be of no further value. This assessment is made annually to avoid the unnecessary accumulation of records.

The system of medical record-keeping in all dockyards was studied by a work study team in 1959 and it was decided that the system originated in Chatham should be introduced generally.

It has been noted above that these records refer to industrial employees. William Gunn had experienced difficulty with non-industrial employees when he was in the Yard, particularly with a Junior Clerk with the Happy Families sounding name of Mr. Spark, who considered it was very lowering to be obliged to visit the Surgery which, from Dr. Gunn's description, was certainly not a place which would have been visited with very great pleasure. Whether it was for such reasons as this or for some others I have not discovered, but non-industrial employees have not for some years been looked after except in emergency and for medical examinations when travelling abroad on duty, in the Medical Centre.

The industrial employee's first introduction to the Medical Centre is very early in his career in the dockyard, for when the Personnel Department is able to offer him (or her) a job, he is sent to the Medical Centre for a medical examination.

A medical record card is immediately started for him with all relevant details and thus a medical base-line is established.

Until quite recently the medical qualification for a Surgery Assistant was the possession of a St John's or equivalent First Aid Certificate. Officially this is still true today but in practice it is necessary to be a State Enrolled or State Registered Nurse, to be so employed at Chatham. Many of the assistants are former Naval Sick Berth Attendants or Royal Army Medical Corps Orderlies with considerable experience of casualty work and occupational disease and the routine casualty work at Chatham can be left to the Surgery Assistants with supervision and assistance from the Medical Officers as required. This leaves the latter free to undertake the large number of medical examinations required by Statute or by dockyard regulations for administrative duties and for the study of the working conditions within the Yard.

The staff of the Medical Department in September 1966 was as follows:

1 Senior Medical Officer (S.M.O.)
1 Assistant Medical Officer (A.M.O.)
1 Senior Surgery Assistant (S.S.A.)
5 Surgery Assistants (S.A.)
1 Nurse
1 Secretary
1 Clerical Assistant

The duties and *modus operandi* of the department are laid down in three books of regulations — B.R. 2101, 2102 and 2103. As the Medical Officers are also Appointed Factory Doctors they have duties under the Factory Acts though many of these are reiterated in the B.R.s. There are 21 categories of medical examination listed in the B.R.s and a summary of these is given in Appendix E in which are also listed several of the non-statutory examinations undertaken by the Medical Officers who are of course available to see anyone who so wishes during the working hours of the dockyard.

The dockyard working hours are 8 a.m.–4.30 p.m. five days a week but overtime is commonly worked. Whenever more than a hundred men are at work in the Yard the Medical Centre is open and manned and this is normally necessary from 8 a.m.–8 p.m. Monday to Friday, and 8 a.m.–12.30 p.m. on Saturday, while work at night and on Sundays is not infrequent. The Medical Officers are not necessarily on call outside the normal working hours for they share duties for the whole port area with the Medical Officers of *H.M.S. Pembroke* (formerly the Royal Naval Barracks). Thus they are required to perform duties other than in the dockyard while the Medical Officers from *H.M.S. Pembroke* have very occasionally been required to work in the dockyard.

Other duties of the Medical Officers are many and varied. They frequently involve co-operation with civilians with whom most Naval Medical Officers have little or no contact such as Local Authority Health Departments, Local Press officials, Metallurgical Scientists, the Pneumoconiosis Panel, Rodent and Insect Control firms and H.M. Inspector of Factories to mention but a few of those seen during my time in the Yard. The Medical (and Safety) Officers give lectures

to all apprentices in the Dockyard Training College and other first aid and safety lectures are given to all those wishing to obtain First Aid Certificates (with the welcome co-operation of Yard Managers who give their men time off) and to local Civil Defence workers In addition to these duties it is essential for the Medical Officers to maintain close contact with the Safety Officers in constant supervision of the working conditions in the Yard It is also one of the duties of the Medical Officers to examine at their homes all those who have been on the Sick List for more than three months and make recommendations for extension of their Sick Leave or for superannuation

The Senior Surgery Assistant (S S A) is a permanent Civil Servant, able to provide continuity in a department in which the Medical Officers change frequently Thus Mr R Adam the present S S A has occupied the position during the time of five Senior and numerous Assistant Medical Officers The S S A is able to provide knowledge of working conditions personnel hospitals local Authority Health Services and much more besides without which the work of the Medical Officers would be most difficult He supervises the work of the Surgery Assistants and is responsible to the Senior Medical Officer for their attendance and work and his knowledge of the Dockyard Regulations can save many hours and blunders Thus the S S A is in the position of a General Factotum whose abilities can make or break the work of the Medical Department and especially by his local knowledge have a profound and important influence upon the attitude of dockyard employees to the Medical Department

The Surgery Assistants apart from dealing with much of the casualty work are able to take simple X rays with the portable unit in the Centre and to give simple physiotherapy They liase closely with the Safety Department in the early reporting and investigation of accidents give inoculations to workers travelling abroad and are responsible for the accurate recording of their work including preliminary examination such as height weight urine etc of all those attending for medical examination The nurse is responsible for these duties in connection with the female industrial employees in the Yard of whom there are about 600 at present

While the Secretary is responsible for all secretarial work for the Medical Officers the S S A and the Clerical Assistant the last named fulfils a most important function in the record-keeping of the Department All those who fall sick send their Social Security Sickness Certificates to the Medical Centre and it is the responsibility of the Clerical Assistant to ensure that full details of the illness as entered on the certificate are noted on the Medical Record Card that the employee s department is informed that the certificate is forwarded the same day to the Ministry of Social Security and that notations are made on the Sick and Hurt Lists as appropriate so that at any one time the number on these lists can be determined with accuracy She also notifies the S S A when employees have been on the Sick List for three months or to the limit of their Sick Extension and if any unusual or industrial diseases are given as the diagnosis on the certificate

Apart from those employees already mentioned, there are also connected with the Medical Centre drivers for the three ambulances, as well as cleaners for the Department.

From this sketch of the duties of those working in the Department it can be seen that they are essentially a close knit team with many inter-related functions. The maintenance of good relations with Naval and Civilian Managers, with departmental and divisional heads, with industrial employees and with the Trade Unions is only possible where each member of the team knows and performs his duties to the full.

A further responsibility is the maintenance of good relations with local General Practitioners, local Health Authorities, the National Health Service Hospitals and also with the local officers of the Ministries of Labour and Social Security. While this rests primarily with the Senior Medical Officer, other members of the staff have a most important part to play.

One aspect of this responsibility concerns the employment of Registered Disabled Persons. Out of a total of 8,400 industrial employees (May 1965) 171 were registered as disabled — a total of 2 per cent. While this falls below the legal requirements of industry to employ three per cent of Registered Disabled Persons (Government departments are exempt from this obligation but usually try to meet or exceed it) the Ministry of Defence (formerly the Admiralty) continues as in Dr. Ginn's day to look after its own employees and there were 249 (3 per cent) on permanent restriction of duties in addition to the Registered Disabled Persons. If those on restricted duties were to leave the Yard, they would probably have to register as disabled to find employment.

The position with regard to hospital treatment is undoubtedly less happy than when the Royal Naval Hospital was open. It has already been mentioned that full advantage of this was made, and when it closed dockyard employees had to use the services of the National Health hospitals. These give an excellent service for emergency treatment when required but there is sometimes inevitable delay in admissions to hospital for less urgent treatment, resulting in a considerable loss of working time. By taking full advantage of the facilities in the Casualty, X-ray and Physiotherapy Departments, and using the services of the Mass Miniature Radiography Unit and Pathology Departments of *H.M.S. Pembroke*, the staff are able to keep the needs for using hospital services to a minimum, which helps to maintain a good liaison with the hospitals, enhanced by personal contacts between hospital and Medical Centre staff, and reduces the inconveniences of waiting to a minimum.

When the present Medical Centre was occupied in 1962 the First Aid Centre was closed. With the good new roads that have been built in the Yard, ambulances are able to reach any part of the Yard within a very few minutes. All calls for the ambulance go via the Medical Centre where one or two ambulances are on call whenever the Centre is open. This makes it possible for a Medical Officer or Surgery Assistant (or both) to travel to the scene of any accident and reduces wasted time. Surgery Assistants have the authority to proceed straight to hospital in an emergency and in such cases there is seldom more than a ten minute wait between the occurrence of an accident and the patient's arrival at hospital.

With Dr Gunn's day the work of the Medical Department is summarised quarterly in a report to the Medical Director General (Naval) It is not now customary to make such complete statistical returns as those mentioned in Chapter V but a summary of attendances at the Centre of employees in the Yard and of preventive and other work undertaken by the department is made

I have in this chapter tried to indicate the nature of this work and in the final chapter I hope to give some personal views on how this may change and to show how the history and development of the Medical Services in the Yard can be used in the future

CHAPTER VII

THE MEDICAL SERVICES — PAST, PRESENT AND FUTURE

In the 350 odd years which have elapsed since the first Medical Officer John Pawson was appointed to Chatham Dockyard he and his successors have made a valuable contribution to the safety and welfare of the employees in the dockyard and to the efficient functioning of the Yard With the introduction of new methods of ship building propulsion and repair new systems of management distribution and control of labour with the acceptance of new standards of living and working and new responsibilities for the health and welfare of employees by both the State and employers and with the advances in our knowledge of the hazards of the many varieties of work undertaken in a Royal Dockyard the work of the Medical Department of the dockyard can never be said to be completed

Chatham Dockyard offers a field of research into industrial hazards which has as yet been little used When Professor Schilling of the London School of Hygiene and Tropical Medicine and his colleagues visited the Yard to undertake some research into the hazards of dust in the Ropery (Mant *et al* 1965) this was the first time that advantage was taken by the Medical Department of the opportunities offered for scientific research in industrial medicine The dockyard cannot of course be regarded as a research organisation for the convenience of Industrial Medical Officers but there remains much which can be done The problem of noise is one which has been causing increasing concern recently though it is not a new problem as we have seen from Dr Gunn's letters In 1966 the Yard was visited by Surgeon Commander R R A Coles a naval E N T specialist with a special interest in the problem of noise and measurements of noise levels in various situations in the Yard were taken The results were somewhat disturbing and while some action was taken following Dr Coles recommendations there remains much to be done in research and in action The removal of the sources of noise obviously presents enormous and costly practical problems and while research into the design of ear protectors continues (Rice *et al* 1966) much work can be done in the field of health education both for management and employees to see that the protective measures currently available are used effectively

Quite recently improved communications have led to the wide dissemination of medical knowledge and along with this the possibility of direct contact with experts in various branches of occupational hygiene The above two pieces of research indicate the way in which advantage may be taken of this In the early days the Dockyard Surgeon must have been in a very isolated position but now

he is able to make full use of modern technology Contacts with others in the field of Industrial Medicine are a great stimulus to better practice and the visits arranged for students on the Occupational Health Course at the London School of Hygiene and Tropical Medicine in 1965 and 1966 serve as another example of this

At the time of the changes in the management structure safety in the Yard became the responsibility of a Yard Safety Officer working on the staff of the Personnel Manager There is a close co operation between the Safety Division and the Medical Department but with a common objective and approach to the problem of the prevention of accidents I feel more could be achieved if the two were to work as one department This would, I am sure, make it easier to launch a major campaign in the important sphere of safety Dr Gunn noted that Accidents are sure to occur but insufficient work has been done as yet on how many of these are preventable. At present the Yard Safety Officer and his two assistants investigate and report on every accident in the Yard and at the end of the year he makes an annual report on Safety in the Yard including details of some accidents the amount of time lost, etc This report is made quite independently of the Senior Medical Officer's Quarterly Journals and there is no link between the two officers in the preparation of their reports in each of which the other is vitally interested The danger of separating the two departments it seems to me is that one becomes responsible for accidents and the other for toxic hazards and hygiene instead of each having a joint concern for health in industry

The Yard Safety Officer's report for 1965 shows that there were 280 reportable accidents in the Yard that year of which ten caused head injuries and 43 affected the foot or toe Exact medical details of these are not recorded in the report which was followed by considerable co-operation between the Medical and Safety Officers to encourage the general use of safety helmets and protective boots Both officers are greatly concerned in the supply and proper use of safety and protective clothing and their efforts could well be combined as both are needed in the education of all levels of management and employee in the Yard to take the best advantage of modern developments in this field

The introduction of iron into the building of ships was seen to create many problems for the Medical Department in the mid nineteenth century Today a new problem faces the department for the age of Nuclear Propulsion is reaching Chatham and major alterations are being made in the Yard to enable nuclear submarines to be refitted and refuelled there The Nuclear Power Superintendent is in charge of this important project and a health physicist was appointed in 1965 Meetings have already taken place with local Health Authorities the Press and others concerned and it is hoped that by the proper use of such conferences local doubts as to the safety of this work will have been allayed This was an interesting lesson in health education while I was working in the Yard and is a matter which will require constant vigilance by the Medical Officers of the Intire for while the precautions against any accident and against the careless discharge of radioactive material are very great the maintenance of high standards in the

future may not be easy. It can be said that much has been learned from the lessons of Dr. Gunn's day about the introduction of new methods in the Yard for the new plans have been both properly studied and skilfully published in a way which does not seem apparent in the early days of iron ships.

In the last chapter the system of record-keeping and of making reports in the Medical Centre was described in some detail and it was shown how this has developed from the past. In Industrial Health Services throughout the country new schemes and ideas are constantly proposed and tried and there is a real need to keep up with modern developments in this sphere. The present system works excellently but little real use is made of the data collected. Valuable work in the study of morbidity could be done in the Medical Centre and if such work were to be undertaken, new systems of recording and processing the data might have to be considered. The elaborate reports of the 1890s have been demonstrated and it may have been because insufficient advantage was taken of this work in the study of morbidity that today's reports contain less statistical detail. This is a field in which the Medical Department could in the future make a real contribution to the science of epidemiology.

The early surgeons at Chatham were usually local men who once appointed, remained in office until their retirement. Although there was some loose control from London they appear to have been more or less their own masters. While this gave some continuity it may have led to some stagnation which the shorter terms of office of modern Senior Medical Officers should obviate. The Department of the Medical Director General (Naval) is ultimately responsible for the provision and control of the Medical Services in the dockyards and the continuity is provided more by the Senior Surgery Assistant than by the Senior Medical Officers. This may tend to lead to less long-term research within the Medical Departments but this could possibly be improved by greater uniformity in the Departments in different dockyards. Much might be achieved by the appointment of a Civil Servant in the Department of the Medical Director General (Naval) to supervise the work and functions of the Senior Surgery Assistants rather than by the lengthening of the terms of office of the Senior Medical Officers.

It can be seen that the development of the Medical Services in the dockyard is a continuing process not a subject of ancient history. The injuries which occur and the methods used in their treatment have evolved with changes in ship building and repair and will continue to do so. The realisation of the need for the prevention of illness and injury has caused a shift in the emphasis of the work of the Medical Officers. Alterations in management, in machinery in social attitudes in medical ideas and even in the keeping of records have all meant continuing changes in the Medical Department. To prove its value the Medical Centre must not, however, become merely an ancillary department of a large industrial concern but must be prepared in the future as it has in the past to be the instigator of change in the interests of health in industry. While their history lies in the past, the development of the Medical Services in Chatham Dockyard is a part of the future, not only of the dockyard but of Medicine.

APPENDIX A

Employees in the Yard in the Eighteenth Century

Occupation	*1711*	*1772*	*1792*
Shipwrights	546	659	599
Caulkers	53	80	58
Blacksmiths		55	63
Joiners	41	40	43
House Carpenters	40	59	78
Bricklayers	19	13	25
Bricklayers Labourers		13	24
Sailmakers	11	34	34
Riggers	149	53	70
Riggers Labourers		23	31
Scavelmen	50	54	60
Labourers	157	172	256
Teams	8	11	16
Sawyers	56	84	88
Blockmakers	2	2	3
Plumbers	3		
Oakumboys	21		
Pitch heaters	4		
Coopers	3		
Quarterboys	24		
Braziers	3		
Locksmiths	2		
Spinners	83		
Hatchellors	10		
Boys	2		
TOTAL	1 287	1 352	1 478

Approximate numbers of industrial employees in the Yard 1700–1965

1700	890	1859	3 000	1939	12,000
1711	1 287	1864	4,000	1945	
1714	860	1883	5 174	1965	8 500
1772	1 352	1893	5,896		
1792	1 478				
1794	1 500				

APPENDIX B

Classification of Diseases

This system was used by Medical Officers in the dockyard at the end of the nineteenth century

1 General Diseases Section A e.g. Small Pox Measles Enteric Fever Scarlet Fever Diphtheria Ague Erysipelas

II General Diseases Section B e g Rheumatism Gout Phthisis Haemoptysis Syphilis Cancer

III Diseases of Nervous System e g Apoplexy Vertigo Epilepsy Neuralgia Insanity Cephalgia Ophthalmia

IV Diseases of Circulatory System e g Organic disease Aneurysm Haemoptysis Varicose Veins

V, VI Disease of Absorbent System and Ductless Glands e g Bubo

VII Diseases of Respiratory System e g Catarrh Bronchitis Asthma Pleurisy Pneumonia

VIII Diseases of Digestive System e g Cynanche Dyspepsia Diarrhoea Colic Hernia Jaundice Hepatitis Enteritis

IX, X Diseases of Urinary System e g Nephritis Fistula Cystitis Stricture, Orchitis

XI Diseases of Organs of Locomotion e g Loose cartilage Periostitis Disease of Bones Bursa

XII, XIII Diseases of Cellular Tissues e g Phlegmon abscess Ulcer Scabies Debility

Wounds and Injuries e g Lead poisoning Fracture Contusions Burns

This classification does not follow that in the first edition of the Nomenclature of Disease published in 1869 nor that in the second edition published in 1884

APPENDIX C

Statistical Abstract for 1892

Average Strength		6 184
Number of cases of Disease or Injury	Sick List	1 637
	Hurt List	409
	Total	2 046
Number invalided	Sick List	41
	Hurt List	4
	Total	45
	Ratio per cases under treatment	21 94
Number dead	Sick List	44
	Hurt List	1
	Total	45
	Ratio per cases under treatment	21 94
Number discharged cured	Sick List	1 472
	Hurt List	343
	Total	1 815
	Ratio per cases under treatment	887 09
Number discharged to Hospital		60
Number of Cases Remaining		81
Average Number of Persons Daily Sick		88 18
Average Number of Days Treatment per case		15 7

In 1965 there was an average of 8,511 Industrial Employees in the Yard (1892 figures include non-industrial employees). There were 313·3 of these on the Sick List on any day on average and 27·1 on the Hurt List there being 5,490 fresh cases placed on the Sick List and 301 on the Hurt List during the year.

Figures for the two years are determined in different ways and not strictly comparable but the figures for the average number of persons daily sick 88·18 in 1892 and 313·3 in 1965 must be compiled in similar ways and show a marked difference.

APPENDIX D

Summary of Abstracts 1886-92 and 1965

Year	*Average No. in Yard*	*Average No. Sick Daily*
1886	5,946	98·0
1887	5,358	72·41
1888	6,029	71·6
1889	5,330	66·8
1890	5,670	87·5
1891	5,787	95·0
1892	6,184	88·18
1965	8,511	313·3

APPENDIX E

Medical Examinations carried out in Chatham Dockyard according to Dockyard Regulations (B.R.s 2101, 2102, 2103)

1. Asbestos Workers — Annually including chest X-ray and Wright Peak Flow Meter test.
2. Drivers (Locomotive) — Vision test every 5 years up to age of 60 and annually thereafter.
3. Drivers (Motor Transport) — Vision test every 2 years up to age of 65 and annually thereafter.
4. Entries — Pre-employment medical examination for all industrial employees entering or re-entering the Yard and on entry into one of the grades in this list.
5. Establishment — Examination necessary before establishment on Civil Service List.
6. Extension of Service over age 65 — Annually including chest X-ray.
7. Firemen — Annually including test in use of breathing apparatus and chest X-ray.
8. Foreign Service — Medical examination, chest X-ray and immunisation as required for Industrial and Non-industrial employees sent abroad.
9. Fresh Water Tank Cleaners — monthly and annual chest X-ray.
10. Foundry workers — Annually including chest X-ray.
11. Metal Sprayers (not lead) — Quarterly.
12. P.I.P. (Kooncote) — Quarterly.
13. Submarine Escape Course — Chest X-ray and examination of all those going on courses — usually prior to submarine trials.

14 Chrome Workers — fortnightly
15 Divers — Full examination including chest X-ray and exercise tolerance test 6 monthly and brief examination monthly
16 Food Handlers — Annual chest X ray
17 Industrial X-ray workers — Clinical Ophthalmic and Haematological examinations
18 Lead Workers — Weekly monthly or quarterly depending on process
19 Shot and Sand Blasters — Annually including chest X-ray
20 Young Persons — Annually to age 18 including chest X-ray

Other examinations routinely undertaken but not required by regulations

21 Compensation — All claimants for industrial compensation
22 Extension of Sick Leave — After being on Sick List for 3 months and then as required
23 Invaliding — Full examination required before a man can be invalided
24 Registered Disabled Persons — Annual review
25 Restricted Duties — All those on Permanent List annually and others on expiry of time on list
26 Sick List — Selected workers on Sick and Hurt List on return to duty usually if there is a possibility that the work is not suitable.

APPENDIX F

Senior Medical Officers of H M Dockyard Chatham 1625–1966

Date of Appointment		*Date of Appointment*	
1625	J Pawson	1888	R Griffiths
1639	R Wye	1892	J Trimble
1669	J Conny	1893	A Whitley
1695	T Drewitt	1894	J Dudley
1725	P Logie	1895	J Sweetnam
1754	J Hammond	1899	A Russell
1774	H Macklerath	1900	A Christie
1803	J White	1903	S Hamilton
1820	D Rowlands	1904	G Smith
1838	G Johnstone	1907	E Ward
1842	W Warden	1910	F Bradshaw
1849	P Suther	1913	E Courtmacsherry
1855	W Bruce	1914	H Beatty
1859	W Gunn	1917	E Pickthorn
1865	J King	1917	J Ferguson
1869	H Piers	1918	H Gill
1872	J Jack	1921	R Stanistreet
1875	S Clift	1924	G Hamilton
1879	J Meiklejohn	1927	J Johnson
1882	C Slaughter	1928	L Moncrieff
1882	J Thomson	1930	F Fitzmaurice
1885	S Bamfield	1933	F Vey

Date of Appointment		*Date of Appointment*	
1934	T Gwynne Jones	1953	J Reese
1936	C Savory	1955	G Miller
1938	G Kirker	1957	A Robinson
1939	P Rivaz	1959	W McKee
1946	P Button	1962	K O Byrne
1946	R Anthony	1965	J Sheppard
1948	E Malone	1966	J Kemp
1950	J Neil		

ACKNOWLEDGMENTS

I am greatly indebted to Mr Pearsall the Custodian of Manuscripts at the National Maritime Museum Greenwich to his staff and Commander Godfrey of the Public Record Office for their assistance in finding my material My thanks are also due to Mr R Adam of the Medical Centre Chatham Dockyard and to Dr A W W Robinson — a former Senior Medical Officer there — now at the Ministry of Health for their help in providing more recent data Is

I am most grateful to Miss Davies Photographer of Chatham Dockyard for Plates II III and V and the Photographic Department of the National Maritime Museum for permission to publish Plates I and IV

This work would have been almost impossible without the books on Medicine and the Navy 1200 1900 and I am most grateful to the surviving author Professor C Lloyd and to the late Surgeon Captain J L S Coulter RN(Ret'd) not only for their books but for their personal encouragement at a time when the dust of ancient manuscripts seemed impenetrable

This dissertation could not have appeared as it is without the encouragement typewriting and patience of my wife—to whom I am deeply grateful

My thanks for permission to publish are extended to the Medical Director General (Naval) Surgeon Vice Admiral E D Caldwell *CB QHP*

REFERENCES

ALLISON R S (1943) *Sea Diseases* UCSD

GRACE J C (1946) *Some Notes on the History of Chatham Dockyard* Printed privately Public Library Chatham

DICKENS C (1857) *Little Dorrit*

KEEVIL J J (1957) *Medicine and the Navy* E & S Livingstone Ltd I 54

KEEVIL J J (1957)[a] *Medicine and the Navy* E & S Livingstone Ltd I 205

KEEVIL J J (1957)[b] *Medicine and the Navy* E & S Livingstone Ltd I 222

KEEVIL J J (1958) *Medicine and the Navy* E & S Livingstone Ltd II 105

KEEVIL J J (1958)[a] *Medicine and the Navy* E & S Livingstone Ltd II 132 143 149

LIND J (1753) *Treatise of Scurvy*

LLOYD C and COULTER J L S (1963) *Medicine and the Navy* E & S Livingstone Ltd IV 11

LLOYD C and COULTER J L S (1963)[a] *Medicine and the Navy* E. & S Livingstone Ltd IV 245

MUNT D F GAUVAIN S WALFORD J and SCHILLING R S F (1965) *Brit J Industr Med* 22 196

RICE C G and COLES R R A (1966) *Brit J Industr Med* 23 194

ROBINSON A W W (1958) *Typescript of a lecture on Chatham Dockyard* Personal Communication 1966

THOMSON M (1959) *Some Notes on the Building of HMS Victory at Chatham and the Dockyard at that Time* Management Training Centre Chatham Dockyard

WILLIAMS R C (1951) *The US Public Health Service 1798 1950 The Commissioned* Officers Association of the USPHS Washington DC

Note—There are many references to manuscript sources which have not been quoted in detail These are obtainable from the author

THE PROBLEM OF MEDICAL SUPERVISION OF LEAD WORKERS*

By S Grome Ramsford

The medical supervision of lead workers is a very complex and highly controversial subject For this reason I should like to make it quite clear that any views or criticisms I may express with regard to the present of future methods for the supervision of lead workers are entirely my own and are not necessarily the official views of either the Ministry of Labour in general or the Factory Inspectorate in particular

In the past six years the Factory Inspectorate has investigated clinically and pathologically over 4 000 lead workers It would be inappropriate in a paper such as this to give anything like a complete account of these investigations It is however, proposed to give some of the conclusions drawn from them together with some facts and figures to justify them

The most disturbing factor that has come to light from these investigations is that the worker can be severely poisoned by lead without either having symptoms or showing clinical signs of plumbism Even when symptoms were present they were often so mild and of such a non-specific character that they only became significant when supported by pathological evidence of lead poisoning For example probably the commonest early symptoms of lead poisoning are abdominal discomfort dyspepsia loss of appetite and general aches and bodily pains the latter being frequently described as rheumatism fibrositis etc In one series of 400 cases analysed it was found that 5 25 per cent of the workers complained of these symptoms but in 1 3 per cent pathological tests definitely excluded lead as a cause In this particular series these symptoms were considered to be of a definite nature if they caused loss of working time or called for medical advice and treatment It will be seen, therefore that in almost 1 in every 5 workers definitely suffering from these symptoms the cause was not due to lead poisoning Furthermore, among these 400 cases there were 22 cases in whom pathological tests indicated with little doubt that they were suffering from lead poisoning Only 6 of these cases had definite symptoms in other words there were 16 cases of sub clinical poisoning in a total of 22 in whom the diagnosis could not have been made on clinical grounds alone

Of all the clinical signs of lead poisoning that of clinical anaemia is probably the commonest and is often the only sign present Yet in another series of 404 male workers it was found that anaemia was reported as clinically present quite erroneously in 3 # per cent of cases in whom the haemoglobin level exceeded 14 0 gms per cent Yet in cases with abnormally low haemoglobin levels it was not recognised clinically in all cases until the haemoglobin level was 10 0 gms per cent or less Between 10 0 gms per cent and 11 0 gms. per cent it was reported as being

*Paper presented at the proceedings of the Lead Development Association at a meeting held at the Cafe Royal on 8th June 1955

present in the [illegible] cent of cases between 11·0 gms. per cent and 12·0 gms. per cent in 42·3 per cent of cases and between 12·0 gms. per cent and 13·0 gms. per cent in 29 per cent of cases.

Professor Lane (1949) drew attention to the fact that facial pallor often unrelated to anaemia was a clinical sign of plumbism and this could possibly account for some of the cases erroneously reported as being anaemic. The importance of recognising anaemia is shown in Table I. This table shows the incidence of anaemia in male lead workers over the years under review compared with 636 male controls. It will be noted that the incidence of anaemia due to lead has remained fairly constant at between 5·5 and 6·0 per cent of workers. The years 1962 and 1964 were abnormal years for during these years the majority of examinations carried out were follow up examinations in factories which had previously been found unsatisfactory and the results during these years to some extent reflect the effectiveness of the steps taken to ameliorate the conditions found. It will be noted that the incidence of non occupational anaemia tends to be somewhat higher amongst lead workers than amongst the controls. This was due to the high proportion of coloured workers examined in the lead worker group and in whom there is a high incidence of hookworm iron deficiency and other forms of anaemia, whereas the control group contained no coloured workers. It should perhaps be mentioned that one third of the cases of occupational anaemia had haemoglobin levels of less than 11·0 gms. per cent whereas most of the cases of non-occupational anaemia were of this severity. Moderate rather than severe anaemia was therefore more characteristic of lead poisoning whereas in other forms of anaemia the reverse was the case.

TABLE I. INCIDENCE OF ANAEMIA IN MALE LEAD WORKERS EXAMINED DURING THE YEARS 1955 TO [illegible]

Year	Plumbism Examined	Haemoglobin Levels gms.% > 13·0	12·1 to 13·0	11·0 to 12·0	< 11·0	Non-Occupational Anaemia	Occupational Anaemia gms.%
55 to [illegible]	[illegible]	111 ([illegible])	18 (16·0%)	18 (16·0%)	4 (3·6%)	4 (3·6%)
[illegible]	400	32 (8·3%)	52 (13·0%)	23 (5·75%)	5 (1·25%)	2 (0·5%)
[illegible]	52	43 (83·0%)	1 (1·9%)	5 (9·6%)	3 (1·9%)	3 (5·8%)
[illegible]	404	8 (2·7)	38 (14·5%)	32 (8·0%)	6 (1·5%)	(6·5%)
[illegible]	8	6 (80·7%)	1 (12·5%)	1 (12·5%)	(0·7%)	5 (62·5%)
[illegible]	3·7	451 (80·0%)	61 (11·1%)	45 (7·0%)	11 (1·8%)	34 (6·0%)
[illegible]	4	410 (92·0%)	3 (0·9%)	2 (0·5%)	(0·5%)	3 (0·5%)
[illegible]	634	405 (95·1%)	6 (1·0%)	1 (0·2%)	4 (1·0%)	5·6

It will be seen therefore that medical supervision will be inadequate unless clinical observations can be reinforced by some kind of pathological investigation. Unfortunately however the pathological investigation of these lead workers showed that there was a very incomplete correlation between the various tests commonly employed in the examination of lead workers, namely, the haemoglobin level of blood the blood lead and the urinary coproporphyrin and A.L.A. excretions

This lack of correlation is however probably more apparent than real for the pathological findings certainly suggest that when a worker is exposed to a lead hazard he can pass through various stages before developing overt plumbism. Firstly there is a rise in the blood lead level. If this persists it is rapidly followed by a rise in the urinary coproporphyrin and A.L.A. excretions. Later a hypochromic anaemia occurs accompanied by a rise in the reticulocyte and punctate counts. Later still due to the secondary effects of lead probably on the kidney or liver there is a suppression of bone marrow activity and this is shown by a fall in the reticulocyte and punctate counts and at this stage erythrocytopenia contributes to the anaemia. In the later stages of the disease the urinary coproporphyrin excretion, A.L.A. excretion and urinary lead excretion and the blood lead levels correlate well all are high and the anaemia marked. Approximately only one third of such cases have definite symptoms and signs of lead poisoning. On ceasing to be exposed the coproporphyrin excretion in the urine and the blood level are the first to fall later the haemoglobin level rises.

In support of these statements Table 2 shows the relationship between the haemoglobin level and the blood lead levels found in a series of 600 male lead workers. It should be explained that all doubtful cases of anaemia that is to say those cases where there was evidence that causes other than lead contributed to anaemia have been excluded from this Table. This analysis shows quite clearly that all specimens with haemoglobin levels of less than 13·0 gms. per cent have blood lead levels exceeding 50 μgms. per 100 gms. and practically all cases with haemoglobin levels of less than 12·0 gms. per cent have blood lead levels exceeding 75 μgms. per 100 gms. It is however to be noted that a considerable portion of workers with normal haemoglobin levels exceeding 14·9 gms. per cent. 2·4 per cent. had blood lead levels exceeding 100 μgms. per 100 gms.

TABLE 2. SHOWING RELATIONSHIP FOUND BETWEEN Hb. LEVELS IN BLOOD LEAD LEVELS IN 600 WORKERS EXPOSED TO A LEAD HAZARD.

Hb. levels gms%	Total Cases	Blood Lead Levels gms per 100 gms													
		< 50		50 & < 75		75 & < 100		100 & < 125		125 & < 150		150 & < 175		175 & < 200	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
> 14·9	126	33	19·1	53	33·0	33	33·0	1	0·8	6	4·8	1	0·8	1	0·8
< 14·9 & > 13·7	210	30	19·1	70	33·3	56	26·7	17	8·1	7	3·3	3	1·4	1	0·4
< 13·6 & > 12·7	126	19	14·1	61	33·3	45	35·7	11	8·7	3	2·4	5	4	1	0·8
< 12·6 & > 11·5	69	9	0	3	3	7	14·1	13	30·7	13	24·3	13	24·3		
< 11·4 & > 10·7	39	9	3	10	3			3	5	3	3	9	33	13	33
< 11	9	0	3	3				2	33·3	1	11·1	3	33·3		
Total and Incidence %	600	100	0·3	183	3·3	80	35·7	63		46	3·5	34	3·3		
Mean Hb. levels gms%			14·5		14·4		14·1		13·3		12·3				
Hb. range		7	1·6	16·7	11·3	16·3	11·6	16·6	10·6	16·2	9·0	13·5		3·1	
Mean Blood Pb. level gms. per 100 grams			0		36		62		93					3	
Blood Lead Range		12·0	23	26	49	56	4		99	1	124			1	

From a practical point of view it will be seen that 80 per cent of workers with haemoglobin levels of 13.0 gms per cent or higher have blood lead levels of less than 75 μgms per 100 gms and only approximately 5.0 per cent had blood lead levels exceeding 100 μgms per 100 gms.

Table 3 shows the relationship between blood lead levels and urinary copro porphyrin excretion in the same series of 600 male workers. It will be seen from these tables that only 5.5 per cent of workers excreting less than 200 μgms per litre of coproporphyrin in the urine have blood lead levels exceeding 75 μgms per 100 gms and in only 0.2 per cent did the blood level exceed 100 μgms per 100 gms. In only 8 per cent excreting less than 500 μgms of coproporphyrin per litre of urine did the blood lead level exceed 100 μgms per 100 gms. It will however be noted that the correlation between blood lead levels and the coproporphyrin excretion test is even poorer than between blood lead levels and haemoglobin levels for it will be seen that one third of the cases excreting very high amounts of copro porphyrin i.e. more than 2,000 μgms/L had blood lead levels of less than 75 μgms per 100 gms. Nevertheless the very great value of a normal or low copro-porphyrin excretion needs no emphasis for it will be seen that 96.3 per cent of workers with blood lead levels of less than 25 μgms per 100 gms were excreting less than 200 μgms per litre of coproporphyrin and 90 per cent of workers with blood lead levels of less than 50 did not exceed this figure. This figure of 200 μgms per litre of urine for the coproporphyrin screening test showed that this figure was never exceeded when it gave either a +ve or ± reaction.

TABLE 3. SHOWING RELATIONSHIP BETWEEN BLOOD LEAD LEVELS AND URINARY COPROPORPHYRIN EXCRETION IN 600 WORKERS EXPOSED TO A LEAD HAZARD

Blood Lead Levels in mgms per 100 gms of blood	No. of Cases	Urinary Coproporphyrin in μgms per litre											
		< 200		201 < 300		301 < 400		401 < 500		501 < 600		> 600	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 25	111	110	96.1	1	1.1								
> 25 < 50	111	107	90.0	1	1.1								
51 < 75	150	85	11.3	16	11	20	13.3	9	5.1	6	3	6	4.1
> 75 < 100	93	65	7.1	26	21.7	8	10.1	20	14.1	6	1	3	1.9
> 75 < 125	111	1	0.1	1	12.5	1	9.2	1	1	1	0.1	1	0.1
> 125	1	0	0	1	0.6	1	40	1	1.1	6	0	1	11.4
Total Cases %	600	114	1.9	110	0.6	7	2	1	1.1	22	1.1	5	3.7
Copro porphyrin mean		5		110		90		1.90		1110		110	
Range		40	1	250	490	290	1.90	1190	1160	1520	1960	90	3.01

Cp = Coproporphyrin
ALA = Aminolaevulinic acid

In these investigations the quantitative assay of coproporphyrin in the urine was carried out in accordance with the technique laid down by the Rimington (1958) method. There are however a number of factors in relation to the estimation of coproporphyrin in the urine which must be appreciated if reliable figures

of any kind are to be obtained. In the first place coproporphyrin in the urine is extremely labile and is rapidly destroyed by daylight. Samples must therefore be collected in dark amber glass bottles. Even when stored in such bottles at room temperature it was found that the coproporphyrin deteriorated rapidly at a rate equivalent to 30 per cent per day. It could only be preserved for any length of time by storing in the refrigerator in the dark at not more than 2° C. or by being kept frozen. Samples treated in such a manner gave constant findings over a period of one week. For these reasons samples now collected at any distance from the laboratory are transported in liquid nitrogen containers. Secondly it is not generally appreciated that accurate figures for the excretion of almost any substance of urine which includes lead, coproporphyrin, delta A.L.A. can only be obtained from the examination of 24 hour samples. It is quite impractical to collect such samples from active factory workers. Reliance has therefore to be placed on the results obtained from the examination of spot samples. It is however most difficult to assess the value of such figures largely because of the wide variation in the concentration of the urine that is its specific gravity. Also of course the excretion rate of any substance in the urine can vary from hour to hour or even minute to minute. Some of these difficulties can be partly surmounted and various methods have been employed for doing so with a reasonable degree of success. One method is to calculate the excretion in relation to the amount of creatinine in the sample. A simpler method is to use a hypothetical figure for Sp.Gr. and calculate all findings accordingly. Levine and Fahy (1945) recommended that findings on spot samples of urine should be adjusted to a Sp.Gr. of 1024. Most authorities however now agree that this figure is too high. Experimental evidence has been produced (Ramsford 1960) that 1016 was a more realistic figure. Another very good reason for employing this figure is that it was found that if the Sp.Gr. of numerous specimens of urine are plotted against the creatinine figures in grams per litre a Sp.Gr. figure of 1016 approximates closely to a creatinine figure of 1 gram per litre. In these investigations both methods were employed and the figures that have been quoted for coproporphyrin excretion have all been corrected either for a Sp.Gr. of 1016 or creatinine level of 1 gram per litre. It

should, however be realised that the further the Sp Gr of a sample deviates from the figure of 1016 the greater will be the experimental error There is no doubt that spuriously high results were obtained on samples of Sp Gr of less than 1008 and some of the discrepancies between the coproporhyrin excretion figure and other findings were due to the difficulty of calculating excretion figures in spot samples of urine

The quantitative assay of coproporphyrin in the urine is a time-absorbing technique which requires full laboratory facilities and highly trained technicians The same applies even more so, to the assay in the urine of its precursor namely delta A L A It is somewhat fortunate therefore that there are a number of comparatively simple techniques for screening urine which will definitely separate those specimens containing less than 200 μgms /L from those containing higher amounts Two tests of this nature were employed, (a) the technique of Woolff (1958) and (b) that of de Kretser and Waldron (1963) No material differences between the two tests were found Numerous quantitative estimations showed that a negative reading with either of these screening tests invariably agreed with a total assay of coproporphyrin carried out by the Rimington (1958) method of less than 100 μgms /L It was also found that + + + reactions were always equivalent to more than 1000 μgms /L In negative tests the supernatant ether extract fluoresces a clear blue with no tinge of red and ± reactions fluoresce a deep purple with blue predominating In the + + reactions the ether fluoresces a pure eosin red with no blue tinge at all The major difficulty with regard to the screening test however arises from the fact that it is extremely difficult in the first place to distinguish between − and + + reactions Employing this test however it is comparatively easy to distinguish between cases excreting very large amounts of coproporphyrin and those with normal or just above normal excretions In the case of + and + − reactions however it cannot ever be assumed that the excretion is not abnormally high (See Table 3) Ramsford (1960) drew attention to this problem with screening tests and has shown that it could be surmounted to some extent without recourse to full quantitative estimations for if various dilutions of the sample were made with distilled water a very close approximation could be made of the quantity of coproporphyrin in the sample if the screening test was applied to such diluted samples From a practical point of view however it should only be necessary to treat those specimens giving a + or + + reaction in this manner

The biggest cause of error in relation to both quantitative assays and screening tests for coproporphyrin was the fact that a proportion of samples received were quite unsuitable for testing because they were too dilute Specimens with Sp Gr of less than 1008 cannot be assayed correctly no matter what method is employed and the correct procedure in such cases would be to request another specimen

The Punctate Count

The method employed was that of Professor Lane (1949) The investigation disclosed little that Professor Lane has not already described and in fact the results confirmed if confirmation is required everything that Professor Lane has already stated

Some additional information concerning the relationship between coproporphyrin excretion, haemoglobin levels and the punctate count has however become available and this may be of interest. Fig. 1 for example shows the distribution curve of the coproporphyrin excretion and the punctate count in relation to haemoglobin levels amongst 563 male lead workers. It should be explained however that the punctate figures here refer only to the total for coarse and medium punctates. In most of the cases the fine punctate count equalled and sometimes exceeded that of the coarse and medium count. It was however found that the coarse and medium count correlated better with the other pathological findings than the total count which in some cases could be misleading. Lane (1949) drew attention to the difference between the significance of the coarse and fine granulations

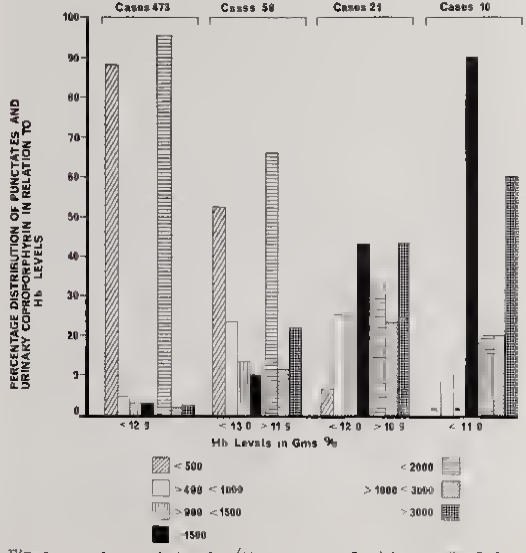


Fig. 1. Coproporphyrin μ Gms / Litres Punctates per million RBCs

of the stippled cells in plumbism It will be seen from Fig 1 that in the [illegible] haemoglobin levels of 13 0 gms per cent and above 96 per cent had normal or low punctate counts yet only 88 per cent had a low normal coproporphyrin excretion At the other end of the scale however that is to say in the most anaemic group, although 90 per cent had very high coproporphyrin excretions only 60 per cent had a high punctate count Furthermore no one in this group had a normal coproporphyrin excretion although in 10 per cent the coproporphyrin excretion was not spectacularly high Between the two groups that is to say the haemoglobin levels of less than 12 0 gms per cent but more than 11 0 gms per cent there was good correlation between high punctate counts and high coproporphyrin excretions

From a practical point of view therefore it is important to note that severe anaemia can occur in lead poisoning when the punctate count is low or normal This phenomenon was noted by Lane who attributed it to some secondary effect of lead on the haemopoiesis and it is suggested here that it may be due to the effect of lead either on the kidney or liver or both That it certainly effects haemopoiesis is confirmed by the fact that these cases all show a reduced or normal reticulocyte count The very fact that the punctate count is low in the presence of anaemia and a raised blood lead level is therefore a valuable sign of severe poisoning and indicates that urgent action is required for both the treatment of the man and for ameliorating his working conditions

The characteristics of the punctate count too can be extremely valuable sometimes in distinguishing between early cases of lead exposure and those cases recovering from past exposure This fact was pointed out by Lane (1949)

It must be clear from these pathological findings that no single pathological test alone can give any sort of accurate estimate as to a lead worker's condition Only by studying all the pathological evidence available can the condition be properly assessed It must however be obvious that it would be impractical to submit all lead workers to a comprehensive pathological investigation Furthermore it would be highly undesirable for as Professor Lane (1949) points out, routine venupunctures among factory workers are not likely to be regarded with favour since other methods of control are available The estimation of blood lead, for example, calls for an analytical procedure of the highest order and even a specially constructed lead free laboratory Quantitative assays of coproporphyrin and A L A in urine are also time absorbing procedures requiring full laboratory facilities and highly trained technical personnel Even the punctate count requires great experience and the services of a technician fully qualified in haematological technique if reliable results are to be obtained The ideal method therefore for application in the medical supervision of lead workers should be relatively simple and therefore less costly and one that could be applied frequently without causing the worker any discomfort or inconvenience At present there are only two tests available which will in any way meet the above criteria namely the estimation of Hb level in peripheral blood samples and a qualitative screening test for coproporphyrin in the urine There are however objections that can be raised against haemoglobin estimations In the first place the worker has to submit to his ear or finger being pricked and this procedure as well as causing some discomfort

must carry some degree of risk [illegible] though small Secondly it is for consideration whether estimations of haemoglobin from peripheral blood samples can have an acceptable degree of accuracy for it must be remembered that physiological conditions alone can cause a difference of ±0 5 gms per cent between such findings The collection of blood samples also presents practical difficulties Unless there is a free flow of blood the squeezing of the ear or finger can cause such a degree of haemo-dilution that the results will be spuriously low and if any kind of tourniquet is applied to the finger to cause capillary engorgement the result will be spuriously high Again the measurement of very small quantities of blood accurately calls for a high degree of experience and training in the technique of using a haemocytometer pipette Because of this latter difficulty the Phillips *et al* (1950) Copper Sulphate method was recommended since in this method no volumetric measurement of blood is required Unfortunately however this method requires rather a lot of blood and this fact makes the accurate collection of samples by this method rather difficult Recently a method of collecting 0.2 ml of blood very accurately and automatically has been developed by Lewis and Benjamin (1965) It requires little or no skill or experience With this method of collecting samples almost any of the required techniques for measuring haemoglobin can be applied

It is essential however that any technique employed for measuring haemoglobin should conform with the recommendations of the International Committee for Standardisation in Haematology (1965) One essential recommendation of this Committee in connexion with haemoglobin measurements is that all such measurements must be made against a specified International Haemoglobin Standard A standard which conforms to the International Specification for use with the Cyanomethaemoglobin technique is now in commercial production and can be purchased and, therefore this technique becomes the method of choice Using this technique and this method of collecting samples with reasonable care it should be possible to recognise with a sufficient degree of accuracy all those workers with Hb levels of less than 13 0 gms per cent This method of screening only recognised 67 per cent of workers with blood lead levels exceeding 100 µgms per cent and only 43 per cent in those with blood lead levels exceeding 75 µgms per 100 gms This blood test, however if combined with a urinary coproporphyrin or A.L.A excretion test should provide sufficient information for all practical purposes

Unfortunately there is no simple screening test at present which can be applied for measuring the excretion of delta A L A in the urine which is to be regretted since A L A is so much more stable than coproporphyrin in urine A measurement of the haemoglobin and a coproporphyrin screening test are, therefore tests to be recommended at present as additional routine measures for the continuous medical supervision of lead workers It would however be preferable if routine blood examinations of any kind could be abolished and the blood examination held entirely in reserve for those cases in whom the screening test has indicated that further investigations are desirable Investigations for this reason should be undertaken with two objects in view (a) to develop a simple method for the quantitative assay of A L A in the urine and (b) for screening

urines for excess of lead, for it should be explained here that up to now the estimation of lead in urine has presented even greater technological problems and difficulties than that of estimating lead in blood This is largely because in urine its concentration is 6 to 10 times less than it is in blood

The first duty of H M Factory Inspectorate is to determine whether a health hazard exists its degree and whether it is localised or generalised If generalised, its cause if localised is it due to some difficulty or fault over which the worker has no control or is it due to some personal defect in the worker himself? To make these determinations two methods are employed by H M Factory Inspectorate M O L namely (a) by atmospheric monitoring and (b) by monitoring the health of the working population in the factory As far as lead processes are concerned atmospheric monitoring alone has many limitations In the first place, the information obtained concerning ambient lead in the atmosphere can only apply to the period during which the air samples were collected Secondly it is assumed that all cases of lead poisoning that may arise will be the result of absorption of lead via the respiratory tract during the working hours, an assumption by no means always true Lastly, it will largely fail to detect those workers who because of personal defects e.g the nail biters the psychotics the chronic alcoholics and the morons who because of general lack of hygienic principles and carelessness in their methods of working or just general complacency place themselves at considerably more risk of being poisoned than other workers In any case no dogmatic decision with regard to the environment can ever be made until the health of the population exposed has been determined

The application of new tests based on what is now known of the pathological effects of lead has raised medical monitoring of the health of lead workers to a high degree of precision There is little doubt now that cases of sub-clinical poisoning can be detected by such methods and the amount of lead absorbed by workers accurately measured In consequence, the degree of exposure and the health hazard can as a result of medical monitoring be accurately assessed and its source often pinpointed

It must not be thought however that there is now no place for atmospheric monitoring Quite the reverse For many factories especially small factories employ workers on a number of different tasks In these cases it is often necessary to employ atmospheric monitoring to determine which of the tasks is responsible for the condition of such a worker found to be seriously affected by lead Atmospheric monitoring too is very necessary once a serious lead hazard has been localised in order to determine whether the steps taken to ameliorate the effect have been successful Medical monitoring too is very expensive and time absorbing Highly qualified and experienced professional personnel demanding high salaries such as physicians and pathologists are necessary Highly skilled technicians and specially equipped laboratories are also essential and all are in short supply The amount of complete medical monitoring that can be undertaken will, therefore always be limited For the routine control of any lead hazard therefore it is essential that the simpler and more economic methods for both monitoring the environment and the health of the workers should be developed

It is hoped that the investigations outlined in this paper will help those whose responsibility it is to determine what the future policy should be

REFERENCES

DE KRETSER A J and WALDRON H A (1965) *Brit J Ind Med* **20** 35
International Committee for Standardisation in Haematology (1965) *Brit Med J* **1** 645
LANE R E (1948) *Brit J Ind Med* **6** 125
LEVINE L and FAHY J F (1945) *J Ind Hyg* **27** 217
LEWIS S M and BENJAMIN (1965) *J Clin Path* **18** 689
PHILLIPS *et al* (1950) *J Bio Chem* **183** 305
RAINSFORD S G (1960) *Proc XIII Int Cong Occ Hlth* Pp 345 348
RIMINGTON C (1958) *The Assizes Clin Paths* Broadsheet 2
WOOLFF M G (1958) *S A Med J* **32** 368

PSYCHIATRIC PARTICIPATION

By Geoffrey Wallis

Confronted with a sociopath, inadequate person, addict, sexual deviant or mild neurotic a psychiatrist particularly if he is in the Services faces a dilemma of whether to accept or reject the patient. Once he has made this clinical decision, an accepting psychiatrist proceeds on clinical lines whereas a rejector dismisses the person as having a moral or social problem outside the clinical orbit

The acceptor says This patient has a headache which I must treat whereas the rejector affirms This man has a headache because he is unhappy in his ship He must try harder to adjust himself and his problem is not mine

Serious consideration of this obviously very great and important difficulty seems to have been limited to discussions, admittedly frequent, lengthy and ubiquitous, about whether particular diagnostic classes such as psychopathy and alcoholism should qualify for alteration of 'S' in the Pulheems assessment with its over-riding implication of invaliding These arguments are often rather meaningless because the disorder of almost every patient now under consideration can be expressed as either a personality defect or a neurosis so that the psychiatrist can within limits choose the diagnosis which best fits the directives of the Service to which the patient belongs for the disposal he thinks most appropriate This expedient, however much it puts the cart before the horse is a not altogether unreasonable solution of the acceptance-rejection quandary

The notion of acceptance if one may use the word in this technical sense is relatively new Around 1800 the public conscience of England and Wales was roused by the brutal treatment of the mentally ill King George III (Henderson and Gillespie 1956) In 1930 the Mental Treatment Act sanctioned the admission to mental hospitals of patients voluntarily, that is without their being certified insane Curran and Guttmann (1949) warned against the too common assumption that all war-time psychiatric patients should be regarded as criminals or malingerers Now the Mental Health Act of 1959 not only provides for the greatest possible use of informal treatment but also recognises psychopathy as one of four classes of mental disorder Units for the treatment of alcoholics are being created all over England and very many sexual deviants are being treated by behaviour therapy and other methods For Service alcoholics Edwards (1966) and McGhie (1966) advocated treatment and retention rather than scrapping

The history of rejection is much longer Society in the middle ages burnt the mentally ill as witches and in the last century despite King George III and many other influences towards toleration locked them behind enormous walls and gates. Ross (1937) discussed the "perverse" view of mental illness according to which there was nothing wrong with the patient and all he needed to do was to pull himself together and to go about his business Pozner (1961) said that the proposition that alcoholism was a disease was from the Service point of view a mischievous generalisation since its unqualified acceptance would permit the alcoholic

to evade the military consequences of his self-indulgence Szasz (1961) maintains that mental illness is a myth—a system using the strategies of helplessness illness coercion and deceit for goals of domination

Cardinal Heenan (1967) says positively that doctors are the new clergy An acceptor could cite this premise to support his belief that he should translate what presents as a moral problem such as absence without leave into clinical terms like symptoms and signs of depression whereas a rejector will do just the opposite arguing that because a depressed person has been absent without leave he should not be taken into psychiatric care Whichever line he adopts the psychiatrist might quote the Cardinal to excuse his neglecting the axiom of Curran and Guttmann (1949) that the question of sin lies outside the doctor's province and so be coming a moral as well as a clinical arbiter

There are of course many historical variants on this contrapuntal theme and Marjot and Warnants (1967) have struck a new rejectionist note Their policy in Singapore in 1964 was to restrict medical evacuation to the UK to psychiatric patients suffering from major or psychotic illness and they claim that as a result 'in practice no difficulties arose' Of 120 Naval and Royal Marine personnel whom they saw in that year 20 were medically evacuated to the UK 11 were discharged from the Service through executive channels for offences which had led to psychiatric referral and another 4 were given psychiatric treatment in the UK before the end of 1965 Among the remaining 85 69 were serving at the end of 1965 and had had no more psychiatric treatment However to this author's firm knowledge from reliable information and personal experience many of these 85 patients scratched vomited or peptically ulcerated their way home that is were invalided because they somatised their neuroses and several others caused grave concern to their officers and damage to the morale of their ships companies

Rowton Lee (1967) from his experience in a squadron of small ships based on Singapore at that time, reports that when psychiatric referral ended in precipitate return to the ship with far from full and sympathetic evaluation of the patient and his stressful environment, merely a non-specific diagnosis or a bland assurance that nothing was wrong the patient's prospects of becoming efficient or stable were dismal In Rowton Lee's opinion these outright rejections engendered lack of confidence in the psychiatric services

The Inter Services Psychiatric Committee considered a report by Measey (1967) on the difficulties caused by psychiatric patients in small ships in the Middle East where 'the unexpected appearance of a problem sailor on board is most disheartening'

Such are some of the consequences of too much rejection Seemingly they not only cause considerable hardship to the patient and the medical and administrative arms of the Service but also bring psychiatry into disrepute

Holford (1965) showed very clear that Naval medicine has never flourished without infiltration from the civilian main stream of the profession Thus one may expect Service psychiatry to founder unless it follows the modern civilian trend into a more accepting attitude

A psychiatrist cannot completely accept everybody referred to him or adopt a

policy of universal permissiveness but total rejection does no good except to ease the burden of the psychiatrist himself. For these patients whom he cannot altogether accept surely the psychiatrist should be prepared to use his knowledge of the patient and his expertise in human relationships in helping the patient on one hand and the personnel in his or her Service and family environments on the other, to adapt themselves to each other. For this therapeutic process good communication is essential (Hamer, 1967) and, because the psychiatrist may be pressed for time and the patients and others concerned in his welfare quickly on the move, success often depends on the clarity and adequacy of psychiatric reporting.

The ideal remedy for these patients appears to be the Human Problems Conference which McGhie (1965) described after visits to the United States of America and Canadian units in the British Army of the Rhine. At this conference as many as possible of the interested parties pool their skilled resources, opinions and recommendations. They might include the ship or unit medical officer, chaplain, education and welfare officers, divisional and other executive or administrative officers, provost representative and psychiatrist. Unfortunately the organising and proceedings of such a meeting entail many difficulties and inconveniences not the least being that different members have to attend for every person on the agenda, and even an idealist could hardly regard these great endeavours as economical in the treatment of an emotionally inadequate sailor, soldier or airman or his wife or child.

However, on the principles of the Human Problems Conference of communication, joint effort and understanding, psychiatry would function at a higher and more humanitarian level to promote mental health in members of the Services and their families. Application of these methods, trimmed and freely adapted to meet individual circumstances, will expunge the folly and misery of total rejection and the failure of Service psychiatrists to participate fully in human problems.

ACKNOWLEDGMENTS

I am indebted to Surgeon Rear Admiral D. P. Gurd, C.B., Q.H.S., M.D., M.Ch., F.R.C.S., F.R.A.C.S., D.O.M.S. for permission to publish this article.

REFERENCES

CURRAN, D., and GUTTMANN, E. (1949) *Psychological Medicine. A Short Introduction to Psychiatry. 3rd ed.* Edinburgh: Livingstone.
EDWARDS, J. G. (1966) Discussion on Alcoholism. *Roy. nav. med. Bull.*, **16**, 33.
HAMER, A. C. (1967) Minutes of the Inter-Services Psychiatric Committee, June.
HECNAN, J. C. (1967) *Brit. med. J.*, **2**, 430.
HENDERSON, D., and GILLESPIE, R. D. (1956) *A Textbook of Psychiatry. 8th ed.* London: Oxford University Press.
HOLFORD, J. M. (1965) *J. roy. nav. med. Serv.*, **51**, 51.
MCGHIE, J. (1965) Minutes of the Inter-Services Psychiatric Committee, October.
MCGHIE, J. (1966) Discussion on Alcoholism. *Roy. nav. med. Bull.*, **16**, 33.
MARIOT, D. H., and WARNASIS, L. J. F. (1967) *J. roy. nav. med. Serv.*, **53**, 89.
MEASEY, L. G. (1967) Minutes of the Inter-Services Psychiatric Committee, June.
MENTAL HEALTH ACT (1959). London: H.M.S.O.
MENTAL TREATMENT ACT (1930). London: H.M.S.O.
POZNER, H. (1961) *J. R.A.M.C.*, *Army med. Corps*, **107**, 3.
ROSS, T. A. (1937) *The Common Neuroses. 2nd ed.* London: Arnold.
ROWTON-LEE, M. A. (1967) *Personal communication.*
SZASZ, T. S. (1961) *The Myth of Mental Illness.* London: Secker and Warburg.

A NOTE ON FOOT AND MOUTH DISEASE
(Epizootic Aphtha)

By John David Stewart

Foot and mouth disease is a highly contagious condition caused by a filterable virus occurring in cloven footed animals cattle pigs — but sheep and goats are not often affected The disease can be transmitted to man (Armstrong Davie and Hedger 1967)

The disease is so infectious that it can be spread by means of infected fodder or litter by meat and bones of affected animals milk from infected cows or carried from infected to free premises by the shoes of farmers or labourers the feet of cattle claws of birds fur of dogs and cats

SURVIVAL TIME OF VIRUS

Dried on	*Survival Time — Weeks*
Cowhair	4
Flour	7
Hay	15
Bran	20
Mixed with	*Survival Time — Weeks*
Salted Butter	2

In the carcases of cattle and pigs slaughtered in the early stages of the disease and kept under ordinary cold storage conditions the virus remains active for forty days in blood and seventy six days in bone marrow Following dry salting or brine soaking the virus can be recovered from bone marrow after forty two days

The Governmental Committee of 1924/25 was convinced that the occasional outbreaks of foot and mouth disease amongst pigs in this country were due to their being fed upon kitchen refuse from hotels and restaurants arising from infected imported carcases

Pathological Changes

Blisters or vesicles form rapidly after 1 2 days of fever The principal location of which are

(i) Membranes of the lips muzzle tongue and palate and nasal septum (sometimes)
(ii) Between the digits base of super numerary digits and around horns and pads of hoof
(iii) Teats and skin of udder and vulva (in cows)

The affected part is first red and swollen and later the vesicle which contains a quantity of colourless fluid appears It is usually about an inch in diameter

and soon bursts leaving a moist red sore with the remains of the whitened membrane round the edges The sore when occurring in the mouth quickly heals and leaves a hard white cicatrix The sores on the feet may be found to be in a suppurative condition which in severe cases affects tendons and joints

In the virulent type the mucous membrane of the stomachs and small intestine is affected and the animal suffers from diarrhoea and pneumonia whilst in the later stages all the symptoms of septicaemia are present Severe cases usually end fatally In affected calves gastro-enteritis is the principal symptom

Differential diagnosis

(i) Superficial actinomycosis
(ii) Traumatic blisters

REFERENCE

ARMSTRONG R DAVIE J and HEDGER R S (1967) *B.M.J.* **4**, 529

Reviews

FARMING THE SEA By Alexander McKee. Pp 314. London: Souvenir Press Ltd. 35s.

The number of books which have been published in recent years on underwater activities is ample evidence of the growing interest in this field and 'Farming the Sea' introduces a new and very welcome approach.

Already diving techniques are being widely applied to commercial activities in the sea and on the sea bed, and one of today's most pressing needs is to develop the food resources which abound in this environment.

McKee shows quite clearly the direction in which research in this sphere should develop. Although basically it is a scientific publication and its contents factual, it is written in a refreshingly buoyant style full of cheerful anecdotes and good humour. As well as being an experienced diver the author is established as a popular writer. The greatest contribution his writing on this subject can achieve is to bring to the notice of a much wider section of the public the urgent need for a serious effort to be made in farming the sea and in so doing encourage the necessary capital investment. His book is well illustrated and indexed and the only possible criticism which may be made is the tendency of the authors to draw too heavily on the work of his personal contacts and local experience.

I have thoroughly enjoyed reading this book and wish it every success. S M

RECENT ADVANCES IN CLINICAL NEUROPHYSIOLOGY. Edited by L. Widen. Pp. xi + 308. Illustrated. Barking: Elsevier Publishing Co. Ltd. Price 140s.

This volume contains the proceedings of the 4th International Congress of Electroencephalography and Clinical Neurophysiology held in Vienna in 1965 with the papers and summaries of three Symposia on (a) Functions of the spinal cord: experimental and clinical aspects, (b) Modern trends in the neurophysiological investigation of brain diseases and (c) the E E G in stress, physiological and psychological aspects.

The papers in the Symposium on the functions of the spinal cord demonstrate the advances made in recent years, the clinical aspects being mainly concerned with the stretch reflex and its part in various pathological states of muscle tone. The second Symposium includes reports on the use of isotope techniques in the study of regional cerebral blood flow and the consequent E E G changes under normal and pathological conditions while the third Symposium introduces the problem of space science into the discussion of stressful conditions.

The Invention of this book is to bring a wealth of experimental work together and demonstrate that rapid progress is being made in neuroanatomy and neurophysiology. Our own particular interest is in electroencephalography which can be seen in its progressive branch of medicine now that the technique of using electrode recording has been perfected. It is also interesting to read a paper from Sweden on the E E G and echoencephalogram in a series of 298 cases of intra- and extracerebral lesions where it was found that an abnormal echogram occurred especially in temporal lobe tumours, extracerebral haematoma and intracerebral haemorrhage.

This is a magnificently produced and stimulating volume with much of interest in the physician and surgeon as well as the neurophysiologist. J M C

ANTILYMPHOCYTIC SERUM. Ciba Foundation Study Group No. 29. Edited by G. E. W. Wolstenholme, *OBE*, MA and Maeve O'Connor, BA. Pp. x + 165. London: J. & A. Churchill Ltd. 24s.

This is a collection of papers read at a study group on the 20th January 1967. Various international figures describe their work on the use of antilymphocytic serum in both animal experimental work and in one series on 20 patients receiving renal homotransplants. To a subject so bedevilled by jargon as this it might have been well if the editors had consulted the entirebaum of one of the participants Professor K. A. Porter in Recent Advances in which he defines the terms agreed.

The various papers describe the physical characteristics and properties of this immune globulin and give proof of its immunosuppressive activity. This activity is not mediated simply through lymphopenia — indeed the mechanism is really not understood. It seems that the fears that this preparation would potentiate virus disease in recipients have not been realised, though as a heterologous protein it still induces various measurable antibodies.

The consensus seems to be that this substance is too valuable an adjunct in the survival of allografts for its use to be held up any longer by further testing.

This booklet (in the words of the preface) has hard covers and runs to 165 pages including an index. It is beautifully produced. There is no doubt that meetings of this sort

are useful and the [illegible] anybody is much delighted [illegible] that this American embalming [illegible] against the use of the euphemism [illegible] publications the term [illegible] laboratories [illegible] a coupling reaction which does not [illegible] chemically valid and pedagogically satisfying as well as being [illegible]
D O H

THE INTENSIVE CARE THERAPY UNIT AND THE NURSE By Eric K Gardner and Breeda Shelley Pp 167 London Faber & Faber 22s 6d

While some chapters of the book are extremely good overall I was not favourably impressed

There is a marked inconsistency in the depth and detail of information given In short the authors do not appear to have decided for whom they are writing I feel they have missed the student nurse level and do not give enough explanation and detail for more experienced staff spending a longer period in an Intensive Care Unit
V D

MYOTATIC KINESTHETIC AND VESTIBULAR MECHANISMS A Ciba Foundation Symposium edited by A V S de Reuck and Julie Knight Pp xi + 331 London J & A Churchill Ltd 65s

This book gives the text of some 17 papers and the discussions of the 26 persons invited by the Chairman Professor O E Lowenstein to participate in the Symposium The whole amounts to some 331 pages and is profusely illustrated with diagrams of remarkable clarity and some beautiful photomicrograph and electronmicrograph plates

Although the material was divided into four sections Myotatic and kinesthetic mechanisms Vestibular mechanisms — fine structure Vestibular mechanisms — nervous pathways and Vestibular mechanisms — clinical aspects the stated object of the Symposium was to bring together those people interested in the sensory control of posture and movement However in the Chairman's closing remarks he admitted that his object was and could only be partially successful and this conclusion was exemplified by the astonishing lack of vestibular reference in the so-called proprioceptive mechanisms in the posterior extremities

In spite of the two subjects being covered in the one book interesting rather separate groups of workers there is no doubt that the wealth of concisely stated and up-to-date information ensures that the book will find a valued position on the shelves of all who are concerned with either research or advanced clinical practice in these particular fields
R R A C

THE EFFECTS OF ABNORMAL PHYSICAL CONDITIONS AT WORK By C N Davies P R Davis and F H Tyrer Pp 185 London and Edinburgh E & S Livingstone Ltd Price 21s + 11d Postage

This well-produced book contains the papers read at a joint meeting of the British Occupational Hygiene Society the Ergonomics Research Society and the Society of Occupational Medicine held in January 1967 The meeting was the first joint meeting of the three societies and the main emphasis was placed upon the extreme environmental conditions tolerable to working man

Sections are devoted to Extremes of Cold Heat and Pressure (both decreased and increased) with a further section giving Industrial Implications of these severe physical stresses. All of the papers are by experts in their own field and mostly take the form of a review of present knowledge and the lines on which research is being carried out Good lists of references are included which will allow interested readers to gain a fuller knowledge of particular subjects.

Abnormal working conditions have always been of concern to Industrial and Service Medical Officers but this book contains information especially on diving aviation and the hazards of cold wet exposure which is of interest to all doctors
J M Y

SURGERY FOR NURSES Edited by James Moroney MB ChB FRCS(Eng) LRCP(Lond) 11th Edition Pp xi + 803 Edinburgh and London E & S Livingstone Ltd Price 45s + 4s 6d Post

In this book the author has marshalled a great deal of information in a clear and concise manner which makes study interesting and enables the reader to progress by logical steps to a comprehensive knowledge of surgical nursing technique.

The illustrations are excellent and well captioned and having used previous editions as guides when preparing lectures for nurses I am impressed by the new detail which has been included The sections on circulation resuscitation and circulatory collapse are so up to date that they serve to reveal the extent of the deficiencies in a number of standard surgical textbooks I can thoroughly recommend this book to my own nurses
R C T

PRACTICAL MANAGEMENT OF THE ACUTE ABDOMEN Edited by Nigel C. Keddie MA BM BCh FRCS Pp 120 London Lloyd-Luke (Medical Books) Ltd Price 12s 6d

This slim volume which the author states is for medical students should be a useful one in the management of the non-traumatised bowel surgeon Its layout is such that the history and examination of the patient and subsequent investigations are carried out in the logical manner the book suggests then the user will make no grave errors

When the student or very young doctor is presented with an acute abdomen it is easy to forget that abdominal pain may arise quite distant from the peritoneum and indeed outside of the abdomen and the latter chapters of this book deal very adequately with this problem

The author has crowded a wealth of experience into these sections so that the reader of this book may learn quickly and safely to beware of the pitfalls others only learn by bitter experience

A C T

TREATMENT OF COMMON SKIN DISEASES 116 pages 7 blank and white photographs London British Medical Association Price 10s

This little book consisting of a series of 14 recent articles from the British Medical Journal is the first in the Current Practice Series to be published in paperback All the authors are dermatologists practising in this country Apart from lapses in pharmacopoeias only the commoner conditions are covered with special attention to day to day management in G P level

The standard of presentation is so uniformly excellent that it would seem almost unfair to carp at certain recommendations with which the reviewer disagrees e g the use of strong Podophyllin for anogenital warts and the application of Carbon dioxide Snow without subsequent removal of the lesion Also the term polycythaemia while no doubt correct is considered a little irritating when polythaemia is now in general usage

Apart from 7 blank and white photographs in the section on fungal infections there are no illustrations in this book The editor in the preface states that this was done deliberately (presumably to keep the price down) although it obviously limits its value in registered practitioners whose dermatological knowledge at least enables them to distinguish eczema from psoriasis

This really is an absolutely first class and completely up to date publication which no doctor should be without if he wishes to maintain an intelligent approach in his skin patients As value for money it cannot be surpassed

R W B

HAMILTON BAILEY'S EMERGENCY SURGERY Edited by T J McNair MD FRCS(Ed) FRCS (Eng) Eighth Edition Pp 1044 1246 illustrations 278 in colour Bristol John Wright & Sons Ltd Price £8 8s 0d

This eighth edition of this famous work has recently been published and following the death of its original author it is now edited by Mr T J McNair of the Royal Infirmary Edinburgh Its well known format has been retained and as well as covering all aspects of general surgery it contains chapters devoted to the emergency surgery of the tooth the eye and orbit and the ear together with a short chapter on obstetrical emergencies

Many new illustrations are included the quality of which compares favourably with the very high standard of the volume as a whole However one would have liked to see more space devoted to some important subjects as intussusception find regurgitants in children and some treatment is distinctly out dated such as the use of Nor Adrenalin in severe shock while the methods of artificial respiration of Schaefer and Silvester appear to have been given pride of place over the mouth to mouth method The abundant use of initials is rather short Although it is now diligent policy in the Royal Navy for medical officers to take short to treat acute appendicitis and perforated ulcers by conservative methods in the first instance this book remains a most useful — one might say indispensable — companion in all medical officers who may find themselves responsible for the treatment of surgical emergencies C C

YEAR BOOK OF ORTHOPAEDICS TRAUMATIC AND PLASTIC SURGERY 1966 1967 YEAR BOOK SERIES) Edited by H Norman Young MD and Neal Owens MD FACS FICS Pp 444 Chicago Year Book Medical Publishers Agents in UK John Wiley & Sons Chichester Price 76s

This Year Book is one of a series of eighteen in various fields of medicine and one in dentistry It makes available in detailed abstract form the working essence of the cream of recent international medical scientific literature Selection of the material has been made by two distinguished editors H Norman Young is Professor of Orthopaedic Surgery at the Mayo Graduate School of Medicine University of Minnesota and Neal Owens is Professor of Clinical Surgery (Plastic Surgery) at Tulane University School of Medicine Between them they have critically reviewed hundreds of articles published in the world's foremost journals The result is a volume well produced reasonably illustrated and packed with worthwhile information

P D G P

Post-Gastrectomy Nutrition. A Clinical Symposium held under the Chairmanship of F. Avery Jones, CBE, MD, FRCP. Edited by Dennis M. Kinnier Wilson, MB, MRCP, MRCPE. Consultant Editor: Lord Cohen of Birkenhead. Pp. xi + 148. 99 illustrations. London: Lloyd-Luke (Medical Books) Ltd. Price 20s.

This small paper-bound volume contains the eight papers read at a symposium on post-gastrectomy nutrition held on 20th November, 1966, together with verbatim reports of the discussions.

The diagnosis of the problem becomes apparent when it is realised that there is a pool of about 150,000 patients in this country who have undergone some form of partial gastrectomy and that these nutritional deficiencies only become manifest with the passing of the years. Post-operative malabsorption, often running B 12 and folate deficiency, osteomalacia and anaemia, fortunately uncommon and dismissed in a refreshing manner and much good advice is given on the management of what will be an increasingly difficult problem for the general physician.

Professor H. Ellis dismisses vagotomy combined with some form of drainage operation as an alternative to gastrectomy and imparts indicate results which are eminently satisfactory even in gross pyloric stenosis. We want the long-term results of these less radical forms of gastric surgery but there is already some evidence that the faecal fat excretion may rise above accepted normal levels with loss of fat-soluble vitamins and that iron and vitamin B 12 absorption can be diminished.

The wealth of clinical information revealed at this symposium must do much to stimulate further interest in the long-term results of conservative gastric surgery and compel us to reconsider the need for surgery in the young adult with a proven duodenal ulcer.

J M C

Care of the Newly Born Infant. By W. S. Craig, BSc(Glas), MD, FRCP(Ed), FRCP(Lond), FRSE. Third edition. Pp. xii + 635. Edinburgh & London: E. & S. Livingstone Ltd. Price 55s. Postage 3s. 3d.

As a book designed to aid those nonetheless with the care of the new born this book falls between two stools. For the midwife it is too complete in the extent it covers for the doctor it is too discursive and perhaps too commercial with its attitude.

But there be no mistake: the information is extraordinarily illustrations and format are unimpeachable. Further be it from this reviewer to protest in any way the valuable instructions [on] its aim is tempted to say rules] laid down. However as a reader of this work one may in this rule make some comment on the purse style which is redolent of the days when all publications for illness emanated from one London school. No doubt the authors are well aware that the French word toilette was applied to a cloth thrown over the shoulders of a Court Lady when her hair was being dressed and powdered. It therefore jars somewhat when one has a common infant's cot when the word toilet is repeatedly used to describe the necessary attentions to the skin of a baby. As the nightwatchman observed in 'The Lady of the Bargain' so [no] man have their faults. One is a preference for clear precise prose in the manner [in] be fashionably whispered of Q.

Enough has been made of this objection of the purse form in which this work exists. Yet its content is needless advice for both the midwife and doctor. Possibly one might wish [for] some hint of future advances in the biochemical aspirations of Usshur in the genetic and immunological vision of C. A. Clark and R. Finn. It needs Shillay and that objection to silence in that context surpassing, amidst the sage in meditation found. Yet such an eminent author with his excellent collaborators might well banish from assistant of a ghost writer and night-indicted remplacing quotation and work with reward glory mourned.

Despite all the previous ravelling, it is still true that if any Servius dentist is faced with the care of the new born with little experience behind him this work will go a very long way indeed in helping him and if that child does not observed will keep him out of trouble to a most desirable extent. It is therefore well worth its relatively moderate price.

P J P

Diseases of the Newborn. By Alexander Schaffer. Second Edition. 1023 p. Illustrations. London: W. B. Saunders. 12 Dyott Street. Price £7 14s 6d.

Falling in love at first sight is a rare experience but it mutually happens with books. Rare books that is. For the first time in his Preface this reviewer has fallen for an Anderman. Not only does this work look, feel and smell as a beloved should but deeper investigation confirms that she has a constitution of gumi and kindly character.

Despite a list of acknowledgements to many clinical colleagues including Dr. Milton Marcovitz who revised the section on Cardiology and Dr. I. Feinberg, who writes on fluid and electrolyte balance, this 940 odd page book is essentially the work of a vastly experienced Pediatrician with particular interest in the neonate. Dr. A. J. Schaffer. Each section following which references are discriminately selected reads as a clinical discussion at the bedside

Each time I have turned to [illegible] with a problem in the last six [illegible] reference has been frequent [illegible] about discussion with mutual the [illegible] a restricted argument based [illegible] experience and already many wards of consultant John Hopkins Hospital as to the [illegible] open followed by a short but concise guide to management

The author in his preface suggests that his writing may lack something as he is not a Pathologist Physiologist Biochemist and Virologist Here at least one can emphatically disagree he is wrong and it would be impertinent to do so in respect any other of his statements Being a Clinician he writes to and for Clinicians in a language they can understand Hence they can apply Dr Schaffer's own vast experience to their own problems in a way that can only be described as person to person

Decorative and expensive of course as expensive who wants a cheap mistress? P J P

SYMPTOMS AND SIGNS IN CLINICAL MEDICINE By F Noble Chamberlain MD MSc FRCP and Colin Ogilvie MD MRCP Eighth Edition Pp 508 + index with 390 illustrations including 40 in colour Bristol John Wright & Sons Ltd Price 55s

The eighth edition of this wonderfully valuable clinical book has appeared six years after the previous edition of 31 years following its original production Every chapter has been revised and new hundred new illustrations have been added This format of the book must be known to every clinical student and every nonvitiant in medicine and in the opinion of the reviewer this volume represents the best value for money in books on clinical medicine today Chapter by chapter the book deals with the common symptoms and physical signs of disease with the emphasis still on clinical examination Following this in each chapter is a section on the diagnosis of the commonest diseases relating to each clinical system with the assistance of the many scientific aids to diagnosis, such as the ECG the X ray and the laboratory investigational results In addition there are separate chapters on radiology biochemistry and the examination of sick children

The prime purpose of the book remains the same namely to help the clinical student and young doctor in the art of observation at the bedside in order to recognise the law of disease Perhaps in this edition a little more emphasis has been placed upon the physiological or pathological basis of symptoms and signs in disease but this only adds to the value of the book as an aid to interpretation

Of minor importance but nevertheless of great historical and medical interest are the summaries of small portraits of famous physicians in the world of medicine which can be found throughout the book

This edition can be highly recommended to all young physicians as a worthwhile concession to their earliest Clinical Methods L G T

A GUIDE TO HUMAN PARASITOLOGY Eighth edition revised by T H Davey OBE Pp viii + 223 London H K Lewis & Co Ltd Price 35s

This classic guide from the Liverpool School for students of Tropical Medicine first appeared in 1931 The latest edition which has been revised by Professor T H Davey with the expert diagrammatical assistance of the late David Daguiri has changed little although a few minor alterations and additions have been made The most important of these is the addition of new information in Malayan geography and Biology in malaya

This is a very readable book in which the salient abnormalities of the common pathogenic parasites of man in any climate are set out in a simple and concise way and in which the methods of diagnosis are rapid and easily learned It remains a must for those wishing to take the DTM & H and in addition an accurate quick reference book for those involved in the diagnosis of diseases caused by animal parasites J H S

CLINICAL TROPICAL DISEASES By A R D Adams and B G Maegraith Fourth edition Pp x + 582 Oxford Blackwell Scientific Publications Price 70s

This is another product of the Liverpool School of Tropical Medicine which first appeared in 1953 It is not a reference book but is stated in the introduction to the first edition, a handbook giving that information essential for the clinical diagnosis and the treatment of those diseases which occur primarily in the tropics This authors object throughout has been to supply essential facts in dogmatically and concisely as we can which possibly we have avoided speculation

Advances made in Clinical Tropical Medicine have been tremendous and significant since the first edition of this book was published This has necessitated thoroughly fundamental revision and a gradual increase in size of succeeding editions But this has been kept to the minimum with as a result an increase of only 25 pages in the 7½ years since the last edition was published

The book continues to be arranged alphabetically beginning with Abdam and ending with Yaws and each chapter is complete in itself These are pleasant to read and contain all the clinical information required in a tropical navy command J H S

WORLD ERADICATION OF INFECTIOUS DISEASES By E Harold Hinman PhD MD MPH FACP FICS (Hon) Pp xi + 223 Springfield Illinois Charles C Thomas Publisher Price $8 50

This monograph reviews the idea of the elimination of infectious disease on a global basis. It considers the organisation of existing projects their nature and progress It also examines the future outlook for their success and the pros and cons of including other infectious diseases in future projects

After introductory remarks and two general chapters malaria is discussed This first attempt at the eliminating of a communicable disease of man on a global basis occupies very nearly half of the monograph This makes fascinating reading the different aspects and dependent factors of malaria control and the progress achieved in efficient countries and regions are fully discussed and reviewed It is interesting to note that although tremendous progress has been made except in Africa the cost and time required for these control programmes were both underestimated

There follows a chapter each on yellow fever smallpox yaws syphilis and tuberculosis and one on miscellaneous infections including poliomyelitis measles trachoma pinta rabies and mumps typhus plague amyloidosis schistosomiasis and onchocerciasis

The monograph is directed primarily to public health officials and administrators who will be responsible to make the final decisions whether eradication is economically feasible rather than to the technical personnel who will be responsible for execution of such programmes In this respect it provides excellent guidance on the factors which must be considered in the possible eradication of most of the many infectious diseases J H S

HOSPITAL INFECTION CAUSES AND PREVENTION By K E O Williams R Blowers L P Garrod and R A Shooter Second edition Pp xii + 386 London Lloyd Luke (Medical Books) Ltd Price 45s

Everybody carries bacteria and if they enter hospital either as patient staff or visitor they take their infection with them — just as they do if they enter a museum or bus

Unfortunately the hospital patient is frequently at a greater disadvantage in the face of infection than the occupant of cinema or bus Furthermore as the intricacy of hospital procedures increases so do the opportunities for what might be called common infections to have uncommonly deadly effects

Consequently hospital practice and in the longer term hospital design has become increasingly influenced by consideration of the infection threat. A voluminous literature has grown up and the authors of this book who have themselves contributed much to this literature provide us here with a compact account of the knowledge that has been gained

The book is readable thought provoking and if we are honest chastening No one concerned with hospitals can disclaim interest in it There is much of practical value in all P J O M

CONCISE ANATOMY By G M Wyburn J G Whitbrink and M E Tidd Pp x + 219 London Messrs Longmans Green & Co Ltd Price 3s

This book is meant for medical students rather than student nurses The suggested dissections while accurate and valuable are not practicable and the information is quite detailed than necessary for nurse training in which the emphasis is more on physiology However the book is well produced and easy of reference with many useful diagrams It would probably be an asset in the nurses library

A handy little book with plenty of value for the price C F C

LECTURE NOTES IN PHARMACOLOGY AND THERAPEUTICS FOR NURSES By James A Boyle MD(Chicago) MRCP(Edin) MRCP(Lond) Pp 228 Edinburgh & London E & S Livingstone Ltd Price 25s

An extremely useful book for both nurses in training and trained nursing staff

Drugs are well classified and treatment plainly outlined to physiological function with clear diagrams and illustrations

I recommend this book for use in nurse training schools and in Sick Bays C F C

PRINCIPLES OF NURSING By Nancy Roper SRN RSCN RNT Pp xii + 268 Edinburgh & London E & S Livingstone Ltd Price 21s.

This is on the whole a good and comprehensive handbook for nurses in training The subject is impossible to cover in a single volume of manageable size and the author does not attempt to do so

However the references and reading assignment for each chapter should be of value in helping students to use their library sensibly as well as giving good basic information and topics for discussion

A useful book to be used in conjunction with class teaching and practical demonstration C F C

I [illegible] Virology By R H A [illegible] MA MD FRCPE FCPath FRSE and J C Dodds FIMLT FIIF FRPS Pp [illegible] Illustrated Edinburgh & London E & S Livingstone Ltd Price 75s [illegible]d postage

The intention of the authors of this well produced book has been to provide a brief text which amplified by illustrations will give the medical student a clear explanation of all the essential features of medical virology In this they have been successful General features of viruses, laboratory procedures clinical details and infections control are outlined with a wealth of illustrations more than half of them coloured Electromicrographs of virus particles are of particular interest

Written mainly for the non specialist the book should be of special value to the student and to the general practitioner or MOH who wishes to bring up to date as quickly as possible his knowledge of the virus diseases

P J O M

EMOTIONAL STRESS Edited by Leo Levi Pp 280 Basel S Karger Distributed in UK by Academic Press Berkeley Sq W1 Price 99s

This book is a collection of papers read at the International Symposium arranged by the Swedish Delegation for Applied Medical Defence Research which was held at Stockholm in February 1965

These papers provide a review of current research into the problem of emotional stress in the individual at groups of individuals Both psychological and physiological approaches are discussed using established techniques like the psycho galvanic response as well as newer methods like the Defence Mechanism Test There is no attempt to correlate both these disciplines and it is probably in the way that our understanding of stress is likely to advance Previously there has been a tendency to separate the physiological effects of stress from the underlying psychological stroke up if the individual Physiological response to stress should be regarded as a normal homeostatic mechanism but biological variation and psychological factors may militate toward maladaptive behaviour such as anxiety state psychosomatic disorder and hysteria It is the exploration of these additional factors to which attention is focused

One of the attractive features of this symposium is the collection of papers discussing stress in the military and industrial environment The paper by Adelfsoe and Meree on the psychological and physiological reactions of Naval diving personnel breathing air at 13 atmospheres is of particular interest as it illustrates the disparity between physiological response which is minimal in this case and the emotional and behavioural responses

There are two points of criticism however Firstly there is poor correlation between the papers in each section some of which are not well written in they they are difficult to comprehend as hind reading though some attempt has been made to provide a theme Secondly the discussions that follow each section are abbreviated and relegated to the back of the book in small print This is unfortunate as discussions are often a profitable source of correlative ideas

In general this book offers a good review of current work in the cases and future of emotional stress and is of interest to the Services as each of their personnel problems are discussed

L G M

THE CHOLERA PROBLEM By Oscar Felsenfeld MSc MD Pp x ii + 165 Nice Illustrations St Louis Missouri Warren H Green Inc Price $7 25

This book is spiced with quotations gathered from Zeleland to New York and ranging in time from Confucius to Andre Maurois One from Anatol France Everything is not known but much has been said almost stimulates the ancient of this work as a book of reference with a bibliography of nearly four hundred items But for a full description of this book it must be added that the useful knowledge of cholera up to 1967 has been compressed into this remarkable monograph Although there are most interesting sections on such subjects as the difficulties of taxonomy and the identification of the coccigeniable virulence this book has been written primarily as a practical guide for people working in the field Clear and exact directions for dealing with any aspect of prevention diagnosis and treatment are easily found It is essential and encouraging to find warning of practical difficulties often experienced but rarely written about such as low oxygen or a sufficient supply of pyrogen free water in out of the way places In the abundance of so much experience into so few pages even the author's will has had to be moderated and the carefully chosen illustrations repay detailed study I would hate to get near a cholera outbreak without this book

P S F

News of the Service

IMPROVEMENTS AT ROYAL NAVAL HOSPITAL, MALTA

On 10th July 1940 the Operating Theatre and X ray Department at the Royal Naval Hospital Bighi were completely destroyed by enemy action No attempt was made at the conclusion of the war to restore these buildings and the Operating Theatre was installed in ward annexes after certain modifications After a lapse of twenty years these facilities became unsuitable and the construction of an up to date Operating Theatre complex was begun in July 1966 The external portion of the new buildings was prepared while the Operating Theatre remained undisturbed but after six months of building it was necessary to encroach on the interior and the Acute Surgical Unit was transferred to existing facilities at the R A F Air Station at Luqa By September 1967 the buildings at Bighi were completed and the new Theatre Block was opened on the 29th September by Mrs D P Gurd wife of the Medical Officer in Charge

Group at the opening ceremony of the Operating Theatre Block on 24th September 1966

Throughout its existence the Hospital has suffered from difficulties with internal traffic there being only one entrance and one exit for all vehicles which caused considerable obstruction and delay. With a view to overcoming this difficulty a new road was made through the Old Hospital Cemetery and in order to facilitate this a short Service of Deconsecration was performed by the Bishop of Gibraltar on the 15th November 1966. The work then proceeded with the exhumation of the remains and their re burial at R.N. Cemetery San Rocco. The road has been completed and the borders are tastefully laid out with shrubs. Incoming traffic now proceeds through the Hospital Main Gate as before but uses the new road to emerge into the village of Kalkara just above Rinella Creek.

OBITUARIES

Surgeon Rear Admiral (D) Edward Ernest FLETCHER, CBE, MDS(Dunelm) FDS(RCS(Eng) died on Friday 5th January 1968 at the Royal Naval Hospital Plymouth at the age of 81. Born at Bedford on 6th February 1886, E.E.F. qualified as a dental surgeon at Charing Cross and the Royal Dental Hospital in 1907. He held various appointments at the R.D.H. from that date until March 1911. Following this period he was in practice at Plymouth and from 9th April 1910 was appointed as one of the few civilian dental surgeons who undertook dental treatment for personnel of the Royal Navy on a yearly agreement serving in the Royal Naval Barracks at Devonport. In August 1914 he was mobilised and was commissioned in the rank of Temporary Surgeon Lieutenant (D)

[illegible]

Surgeon Commander Holbert Lewis BELCHER *OBE* MRCS LRCP RN (Retd) died on 13th December 1967 in the age of 77. He entered the Royal Navy as a Surgeon Lieutenant on 18th April 1929, being promoted to Surgeon Lieutenant-Commander on 18th April 1935 and to Surgeon Commander on 18th April 1941. He was placed on the Retired List on 11th July 1947. Surgeon Commander Belcher was awarded the Gilbert Blane Medal 1935 and included the *OBE* in the New Years Honours List in 1956.

Surgeon Commander [illegible] [illegible] Scott PEARSON MB ChB DPM RN died on the 26th October [illegible] age of 45. He graduated in Birmingham University in 1945 and joined the RN as a Surgeon Lieutenant on 15th May 1947 being promoted to Surgeon Lieutenant Commander on 16th August 1954 and to Surgeon Commander on 31st December 1961.

A C H writes:

Scott as he was always known was one of a small group of Royal Navy Medical Officers and would be pleased to see him collected at RN Air Station Yeovilton. Fincham has always been known as the immediate post war years to serve the Fleet in the ships. The RNVR personnel had been drawn from Naval Psychiatry through the war years and were returning to their civil posts. Under the guidance of Surgeon Lieutenant Commander (now Surgeon Captain) RTH H C Sylvester OBE, RN a policy for psychiatry was evolved [illegible] to suit the needs of medicine and the psychiatric Service. While that appointment proved the Service psychiatry played an ambivalent part in the respectability it gained [illegible] due to the integrity and honesty of men like Scott. He obtained his Diploma in Psychological Medicine in 1960 and was given Consultant status in 1964.

The writer has [illegible] Scott [illegible] a gentle person, but one for knowledge. He specialised against a Clinical background [illegible] over the chestnut trees [illegible] Regimental Regimental. He was also a keen rugby player until he [illegible] his Achilles while playing at Chatham.

His last years were probably the happiest ones at Millbrook and then at the Royal Victoria Hospital, Netley. At Netley he has given the directing of [illegible] studies which helped him as he knew that in teaching he must also find his own knowledge and [illegible] himself into these duties with vigour and enthusiasm. It was while lecturing [illegible] Haslar that he died suddenly on 29th October [illegible] 1965.

In a ruthless and rapacious world Scott [illegible] and above all compassionately. It was a great tragedy that [illegible] Much of what he was [illegible] in the patients he helped [illegible] to his three children and to his wife Betty.

A C H

NEW YEAR HONOURS 1968

Companion of the Most Honourable Order of the Bath

Surgeon Rear Admiral E S Bradbury *QHP* MB BCh BAO DMRD
Surgeon Rear Admiral D P Gard *QHS* MD MCh FRCS FRACS DOMS

Commander of the Order of the British Empire

Surgeon Commodore N S Hepburn *QHP* MB ChB DTM DTH

Officer of the Order of the British Empire

Surgeon Commander P D G Pugh MB FRCS

Order of St John of Jerusalem

Commander—Surgeon Rear Admiral S Miles *QHP* and Surgeon Captain [illegible]
Serving Brother—Surgeon Commander M J Boyle

HIGHER QUALIFICATIONS

Surgeon Commander R S Forrester—DMJ (Path)
Surgeon Commander F A F Mackenzie—FFR
Surgeon Lieutenant Commander J F Rivers—MRCP (London)
Surgeon Lieutenant Commander A M Hazell—MRCP (Edinburgh)
Surgeon Lieutenant Commander D S Wright—DTH

Awarded the prize of the Society of Occupational Medicine 1968

Surgeon Commander J H Sewell MB BCh DPH DTM & H

PROMOTIONS

To Surgeon Rear Admiral (D) W L N Forrest *QHDS* LDS RCS

To Surgeon Lieutenant Commander [illegible] Gaskell MB BS MRCS LRCP [illegible] M Ashley MB ChB DObstRCOG [illegible] W R Fenton MA BM BCh DObstRCOG [illegible] J Nicholas MB ChB D M Davies MB BCh DPH

To Surgeon Lieutenant Commander (D) A S Shuttleworth LDS C F Morris BDS LDS RCS M D Hickey LDS

To be Surgeon Lieutenant N B Hutchings LAH
To be Surgeon Lieutenant (D) K Green BDS
To be Acting Surgeon Lieutenant R J Fitzgerald MB BCh BAO E W Taylor LRCP MRCS R J G Soper LRCP MRCS W D Bissett LRCP MRCS J B Beavis BSc MB BS A Craig MB ChB T H D Smyth MB BCh W D McNichol MRCS LRCP N Irish MB BS L E Ramsay MB ChB C Bunting MB ChB C W Evans MRCS LRCP R A Cavanagh MB ChB F R Vassall-Adams MB BS MRCS LRCP M J M Barker MB BS B J W Pingree MB ChB J A Quinn MB ChB

Provisional selections to date 30th June 1968

To be Surgeon Captain R St C Mulvaney *DSC* MB BCh W E Crooker MRCS LRCP DPH & H Cowling MB BS DLO
To be Surgeon Commander J B Gill MB BCh A McEwan LRCP & S LRFP & S DTM & H C W Chapman MB ChB R Radford BSc MB BS MRCS LRCP I Bertram MB BS FRCS(Eng) D H Elliott MB BS DObstRCOG
To be Surgeon Captain (D) R Gladhill LDS
To be Surgeon Commander (D) K C R Eve LDS

NEW ENTRIES

Surgeon Lieutenant-Commander Miss R T Blackall, MB BCh Miss F E Mangeitis MB BCh
Surgeon Lieutenant M E Fryer MB BS MRCS LRCP B J Addis MB BS
Surgeon Lieutenant (D) L C Langan BDS
Surgeon Sub Lieutenant M D Cotterall A J Dowell R R Hewett I M O'Brien T Pace S H Vincent T M Wadsworth J S Powell J G Williams J Brooker A J Johnson J H Ussher
Surgeon Sub Lieutenant (D) J F Hart V D G Miller M N D Roberts, A J Shaw

RETIREMENTS

Surgeon *Rear Admiral* (D) W L Monteath *CB OBE QHDS* LDS RCS
Surgeon Captains P O'Brien DA MB BCh FRCS E Boyd Martin *OBE* MRCS LRCP E H Matheson *OBE* MB ChB
Surgeon *Captains (D)* K E J Fletcher LDS W E Starkey *OBE* LDS (appointed Civilian Consultant in Dental Research to the Royal Navy on 22 2 68)

TERMINATION OF COMMISSIONS

Surgeon Commander D G Binett MB BS MRCS LRCP MRCOG
Surgeon Lieutenant Commander H E Black MB ChB MRCP, DObstRCOG J R P White MA RM BCh M A Rowlett Lee MA RM BCh
Surgeon Lieutenants N B Watrall MRCS LRCP DObstRCOG Miss D Banks MB ChB T R G Carter BA, MB BCh G N Coad MB BCh
Surgeon Lieutenant (D) Miss F M Daniel BDS

WARDMASTERS

Promotions

To be Wardmaster Lieutenant Commander G D S Phillips
To be Wardmaster Lieutenant P Brayshaw D M C Pope

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE
NEW YEARS HONOURS LIST — 1968

To be Ordinary Associates of the Royal Red Cross Second Class
Miss Ruth Carter Matron
Mrs Joan Ryan (née Donlan) Matron (now retired)

British Empire Medal
Mrs M M Dickinson Head Naval Nurse

Promotions

To be Matron Misses S K Cam (2 10 67) F S M Luckcraft (11 11 67) J Hurworth (14 3 68)
To be Superintending Sister Misses F O Morris (7 5 67) P K Dowling (21 7 67) P A Davis (1 1 68)

New Entries

Senior Nursing Sister Misses J J Laverick (ex QARANC) J Simpson (ex QARANC)
Nursing Sister Misses P V Bacon Upshon P M Davey S F Lumnion A Mostyn (
McCusker

Retirements

Miss B Quill RRC Principal Matron Tutor (31 5 67)
Miss J Donlan ARRC Matron (28 5 67) On marriage
Miss M Smith ARRC Matron (19 4 68)
Miss D Fisher ARRC Matron (8 3 68)
Miss N R Wallbutton Superintending Sister (16 12 67)

ROYAL NAVAL RESERVE

Promotions

To Surgeon Lieutenant-Commander R C Clark MB BSc M W G Wren MB ChB MRCS D M Jenkins, MB ChB
To Surgeon Lieutenant Commander (D) R N Johnston D M King M D Hocking

Retirements

Surgeon Captain R A McKeown *OBE LRD* MB BCh
Surgeon Commander H R Gray *VRD*
Surgeon Lieutenant-Commander R W Bazeley MB BS MRCS LRCP M Maclean RD MB ChB
Surgeon Commander (D) R E Matthews *LRD*

CIVILIAN

NEW YEAR HONOURS — 1968

British Empire Medal

Mr S A McMullan — Senior Dental Surgery Assistant at the Depot Royal Marines Deal

CIVILIAN APPOINTMENT OF RETIRED RN MEDICAL OFFICER

Temporary Medical Officer HMS Ganges — Surgeon Captain W Wilson MRCS LRCP

Notice

officers to send in [illegible] paper on professional [illegible] items of news and matters of interest to the naval medical service will be welcomed from ships and establishments on home and foreign station. Notices of births marriages and deaths are inserted free of charge to subscribers.

All articles or communications published in the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE will become the property of the JOURNAL with full copyright powers unless the author declares when sending in the article that he desires to reserve the copyright to himself.

The Harvard system should be employed for bibliographical references these references being arranged in alphabetical order of the authors name at the end of the contribution thus: SMITH, F. G. (1935) *J. roy. nav. med. Serv.* **22**, 53. In the text a reference to a publication should be cited by giving the author and in brackets the date thus: Smith (1935) believed this to be due etc. or [illegible] lack of basic information on the strategic fundamentals of the science of the sea (Carlson 1956).

The JOURNAL is published 3 times a year, 3 numbers comprising one volume.

Articles and communications may be sent to the Editor at any time. **They should be clearly written or, preferably, typed and sent in triplicate** to the Editor RN Hospital Haslar, Gosport, Hants.

Subscriptions

For RN and RNR medical and dental personnel on the active or retired list and for Consultants to the Royal Navy the subscription is 20s. per annum (postage included) payable on 1st January of each year. Single copies 7s.

For all others who are *not* in the above categories the subscription is 24s. per annum (postage included) or 8s. per single copy.

Cheques and postal orders should be crossed Lloyds Bank Ltd. and made payable to the Editor, The Journal of the RN Medical Service.

The payment of subscriptions by banker's order is recommended as it relieves the subscriber of the necessity of forwarding a cheque each year and simplifies the keeping of accounts.

All applications for Advertisements to be made to

THE EDITOR
JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE
RN HOSPITAL HASLAR, GOSPORT, HANTS

No 2 Summer 1968 Vol LIV

Journal
of the
Royal Naval Medical Service

PUBLISHED THREE TIMES A YEAR

Editorial

BLACKWATER FEVER

Blackwater fever is a condition rarely met today though those who served in tropical areas during the war particularly with the R A F in Western and Central Africa became very familiar with this condition and learnt that the most important factor in treatment was to refrain from moving the patient during the acute stages, particularly in areas where comfortable transportation was rarely available. As a result of this Blackwater Fever Teams including a medical officer and nursing sister were established which could be transported by aircraft or river boat to treat cases on the spot Early blood transfusion and complete rest were essential

Although the diagnosis in the case reported is probably right this does not follow from the history given the urine picture is not characteristic and the whole sequence of events could have been caused by a severe attack of malignant tertian malaria The report however is very welcome as an indication of the need for medical officers to remember that tropical medicine is still an important requirement in their training

HYPERBARIC OXYGEN THERAPY

It is also appropriate that a comprehensive review of the history and present thoughts on hyperbaric oxygen therapy should be published There has been a great deal of unreasoned criticism of this technique which is based on simple physiological principles and its application to medicine can only be established by controlled investigation The authors describe its 'cyclic' variation in popularity over recent years It is hoped that it is now settling into a respected place in medical treatment from which it can grow where a true demand is established The extensive bibliography which is included with this paper will be of very great benefit to those interested in this and allied subjects The authors draw attention to the fire risk resulting from high pressure oxygen and rightly emphasise the essential precautions necessary to eliminate this

The Naval Medical Service has played a very active part in the establishment of hyperbaric oxygen therapy in hospital practice and the work in this field at present being developed in R N Hospital Haslar is producing definite evidence of success in the treatment of traumatic ischaemia and pyogenic infections

BRAIN OF BRITAIN 1968

We are delighted to see how well Surgeon Commander (D) C J Wilkinson is doing in the radio programme Brain of Britain 1968 At the time of writing he has reached the semi final and we wish him luck in the contest Unfortunately we shall not know the result before we go to print

Articles

HYPERBARIC OXYGEN THERAPY: REVIEW OF THE PRESENT POSITION AND EXPERIENCES IN THE MANAGEMENT OF NAVAL PATIENTS

By Alan H. Tooley and James Watt*

The history of the therapeutic application of air under pressure has been well reviewed by Jacobson *et al* (1964). Hyperbaric therapy has suffered cyclic acceptance and rejection since it was first introduced to medicine by Henshaw an Englishman in 1662. He constructed a 'domicilium' fitted with valved bellows which was capable of producing both a hyperbaric atmosphere which he considered more suitable for acute illnesses and hypobaric atmosphere which he reserved for chronic conditions.

The idea however, did not take on even though, a century later Haarlem Royal Academy of Sciences offered a prize for a chamber which would permit the study of the biological effects of a hyperbaric environment. It was therefore not until the 19th century that compressed air chambers were again used therapeutically pioneered by France following upon the work of Junod (1834). On this occasion it won speedy popularity among the more sophisticated society of mid century Europe and vogue rather than rationale determined its application to such diverse conditions as cholera and rickettic deformities. Only Paul Bert seems to have adopted a scientific approach and he demonstrated in 1878 that raised atmospheric pressure reduced the partial volume of nitrous oxide needed to produce a satisfactory level of anaesthesia. Fontaine (1879) designed a horse drawn hyperbaric operating theatre (fig. 1) which toured the Paris hospitals and reported more rapid and satisfactory recovery from anaesthia carried out in this chamber.

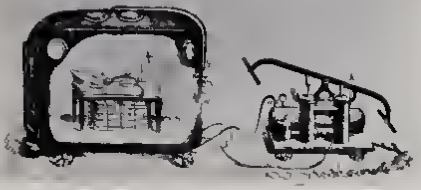


Figure 1. *Fontaine's Hyperbaric Operating Theatre.* 1879.

*Reprints are obtainable from Professor James Watt, RN Hospital, Haslar.

It was [illegible] that such a spate of experimental therapy in an unknown field should reveal unsuspected dangers and we are indebted to Triger (1841) for the first account of bends affecting caisson workers employed on the Loire river bed.

Towards the end of the 19th century interest in hyperbaric therapy waned and we hear little more about it until 1927 when Cunningham built in Kansas City a cylinder 88 feet long and 10 feet in diameter with individual rooms fitted with all the amenities of the times and pressurised to two atmospheres absolute with air. Cunningham was fortunate in finding a wealthy patron who impressed by Cunningham's theory that anaerobic infections were responsible for many common diseases provided the financial resources to construct a huge spherical chamber six storeys high, sixty-four feet in diameter and containing seventy-two rooms (fig. 2). However although Cunningham claimed striking successes, he was reluctant to produce evidence which would satisfy the American Medical Association (1928) and this form of therapy fell into disrepute. Cunningham's chamber survived until 1942 when it was demolished to produce one thousand tons of scrap metal for the war effort after serving successively as tourist attraction, hospital and centre for military pilot training. Grave disservice was done to the cause of hyperbaric therapy by such projects and the current revival of interest is based upon sound scientific observations.

Figure 2. *[illegible] designed by Cunningham*

It is however important to recognise that the early hyperbaric therapy was concerned only with air under pressure in spite of the fact that Priestley had discovered oxygen in 1775. This may have been due in part to Lavoisier's (1783) description of the inflammatory action of oxygen on the lungs of animals. Bert's report of convulsions in birds and animals exposed to long periods of hyperbaric oxygen and in 1899 Lorrain Smith's description of the pulmonary changes of oxygen poisoning in mice breathing 70 to 90 per cent oxygen at only one

atmosphere. However Donald (1946, 1947) whose classic papers arose from work carried out on naval divers during his service in the Royal Navy, never saw oxygen convulsions in man at pressures lower than 3 atmospheres absolute when compression was carried out in dry chambers although oxygen convulsions did occur at these pressures in divers under water. But he found no evidence of lung damage in any of his patients.

These limits having therefore been determined the stage was set for the era of hyperbaric *oxygen* therapy which began with Boerema of Amsterdam who, in 1956 used a chamber provided by the Royal Netherlands Navy as a hyperbaric operating theatre for experimental and clinical surgery. Describing life without blood (1960) Boerema *et al* showed that pigs whose haematocrit was lowered to 0·4 per cent could survive short periods at 3 ATA of pure oxygen on the amount of oxygen dissolved in the plasma. Encouraged by this they were able to operate successfully upon children with Fallot's tetralogy using oxygen at 3 ATA and moderate hypothermia (Boerema *et al* 1962).

Churchill Davidson *et al*., (1955) reported that the hypoxic cells in the centre of malignant tumours became more radio-sensitive if their hypoxic state could be improved by hyperbaric oxygen, after Gray *et al*., (1953) had shown that cells deprived of oxygen have their sensitivity to deep X ray therapy reduced by a factor of three. Gray also claimed that since oxygen did not affect normal tissue cells it was the ideal adjuvant to radiotherapy. Controlled trials are now being undertaken in several centres including that at St. Mary's Hospital, Portsmouth which under the aegis of Dr. J. B. McEwen provides radiotherapy facilities for the Royal Naval Hospital, Haslar. McEwen (1966) reported that, contrary to expectations, preliminary results appeared to suggest that for bladder cancer at least radiotherapy with oxygen at 3 ATA carried a worse immediate prognosis. On the other hand van der Brenk *et al* (1966) reported improved results in the treatment of tumours including bladder cancers, with hyperbaric oxygen.

Smith and Sharp (1960) working in Glasgow reported the beneficial effects of oxygen at 2 ATA in the treatment of patients suffering from carbon monoxide poisoning following up a suggestion made originally by Haldane in 1895. Smith (1965) was able to report that the only two deaths among the 70 patients he treated occurred in patients gassed slowly over eight hours. Hyperbaric oxygen plays the dual role in carbon monoxide poisoning of increasing the dissolved oxygen in the plasma and also of increasing the rate of dissociation of carboxy haemoglobin.

It was natural that attention should be directed to other clinical conditions resulting from hypoxic states and Brummelkamp *et al* (1961) discussed the experimental evidence which led to their remarkable success in the treatment of gas gangrene at 3 ATA. However the clinical application has rarely fulfilled the early promise of animal experiments and the dramatic drop in mortality achieved by Smith and Lawson (1962) using hyperbaric oxygen after ligation of the descending branch of the left coronary artery in dogs, has not yet been established in coronary artery occlusion in man but extensive clinical trials are in progress and give grounds for guarded optimism. Peripheral vascular disease on the other

hand, has proved unusually disappointing apart from temporary healing of trophic ulcers. In spite of the initial enthusiasm of Illingworth (1962) and others Nevertheless hyperbaric oxygen may prove to have a place during disobliterative operations, particularly in regard to carotid artery occlusion (Illingworth 1965) now that McDowall *et al*, (1963) using the krypton clearance method suggested by Ingvar and Lassen (1962) have shown that chloroform unlike halothane does not cause cerebral vasoconstriction which may be advantageous in anaesthesia during hyperbaric oxygen therapy for other conditions by protecting against the danger of oxygen poisoning

Acute traumatic arterial ischaemia is quite another matter since the circulation of a limb may be temporarily jeopardised by a combination of arterial injury haematoma, oedema and fractures and in these circumstances hyperbaric oxygen therapy can buy time until the circulation becomes re-established The same is true of temporarily ischaemic skin flaps

Neonatal anoxic anoxia seemed to be an obvious indication for hyperbaric oxygen and Hutchinson *et al*, (1963) of the Department of Child Health Glasgow using the Vickers infant unit were able to resuscitate neonates after routine measures had failed However they met with little success in the respiratory distress syndrome of the newborn until they learned to correct the metabolic acidosis by intravenous bicarbonate which they showed to be the important therapeutic principle involved (Hutchinson *et al* 1962) Indeed Barrie and Miller (1966) reported the constant finding of severe respiratory and metabolic acidosis in suxamethonium apnoea in rabbits subjected to hyperbaric conditions, in spite of adequate arterial oxygen tensions The work of Boerema indicated that anaemic anoxia would respond readily to hyperbaric oxygen therapy but it is quicker and more logical to give blood, except where this is refused by the patient who may belong to the sect known as Jehovah's Witnesses Reports of such cases are beginning to appear and a personal communication concerning a recent problem of this nature emphasises the speed of recovery and the size of the reticulocyte response The effect of hyperbaric oxygen on stagnant anoxia has also been studied mainly upon dogs suffering from traumatic and bacteraemic shock It is effective only if treatment is commenced early and in the case of bacteraemic shock if the pressure is raised above 2 ATA (Blair *et al*, 1965) Finally, there is some evidence that hyperbaric oxygen in association with hypothermia may improve the results of cadaveric kidney transplantation (Hitchcock *et al*, 1965)

The danger of any new therapeutic method is that it will be hailed as a panacea for everything that may fail to respond to traditional forms of treatment and a spate of ill-substantiated claims for the success of oxygen under pressure aroused the scepticism of responsible investigators Fortunately, the major centres in this country Holland and the United States recognised that the new therapy was largely experimental and that a great deal of animal research would be necessary before the benefits and dangers of hyperbaric oxygen could be fully assessed Preliminary studies were reported at the First, Second and Third International Congresses in Amsterdam (1963) Glasgow (1964) and Durham, USA (1965) and a large number of controlled trials are currently being conducted, supported by com

prohibitive expense of the biochemical enzyme blood gas and haemodynamic status of experimental and clinical material which should give their results the stamp of validity

RATIONALE

Hyperbaric nomenclature is confused by the fact that the gauges used to record pressures are calibrated in accordance with commercial engineering practice and are similar to those used on pressure tanks and caissons Table I is in attempt to correlate equivalent terms

TABLE I
Pressure Equivalents

DEPTH IN WATER	BARIC PRESSURE			GAUGE READING	
	lbs sq in	mm Hg	Atmospheres Absolute	lbs sq in	Atmospheres Gauge
Surface	14 7	760	1	0	0
33ft (10 06 m)	29 4	1570	2	14 7	1
66ft (20 12 m)	44 1	2280	3	29 4	2

The concept of hyperbaric oxygen therapy is based upon enough physiological evidence to give reasonable grounds for believing that it has a place in the treatment of hypoxic states which cannot be influenced by other means In fact it provides a practical illustration of Henry s Law which states that the solubility of gases in the blood is directly proportional to the pressures of those gases in the alveoli When the human being breathes air at atmospheric pressure (1 ATA 760 mm Hg or 14 7 lbs per sq in at sea level) the haemoglobin is 97 0 per cent saturated with oxygen and there is an insignificant amount of oxygen (0 3 ml per 100 ml or 0 3 volumes per cent) dissolved in the plasma When however pure oxygen is breathed at 1 ATA the haemoglobin is 100 per cent saturated and therefore any increase in the oxygen content of the blood must occur as the result of an increase in the amount of oxygen dissolved in the plasma Under these circumstances 2 0 ml of oxygen are dissolved in every 100 ml of plasma If pure oxygen is breathed at 2 ATA 4 2 ml of oxygen are dissolved in every 100 ml of plasma When the ambient pressure is increased to 3 ATA of oxygen the amount of oxygen dissolved in the plasma is approximately 6 3 volumes per cent which more than compensates for the normal difference between the oxygen content of arterial and mixed venous blood and should be just enough as Boerema showed to maintain life without haemoglobin (fig 3) This would not however be achieved in practice because as Behnke and Saltzman (1967) have pointed out the oxygen requirements of individual organs vary and

Forster (1967) has shown that the arterio-venous difference of heart muscle may be no less than 10·6 volumes per cent. So much for the oxygen *content* of the plasma in response to hyperbaric oxygen. There is of course a corresponding increase in the oxygen *tension* of arterial blood which ought to accelerate the rate of exchange of oxygen between blood and tissue cells. The partial pressure of oxygen in the arterial blood (pO_2) is 100 mm Hg when the patient is breathing air at 1 ATA (760 mm Hg). If he now breathes 100 per cent oxygen at 1 ATA his pO_2 becomes 760 less the combined partial pressures of carbon dioxide and water vapour *i.e.* 40 and 47 mm Hg respectively giving an effective pO_2 of 673 mm Hg. At 2 ATA this becomes 2×760 less 87 *i.e.* 1,433 mm Hg and theoretically at 3 ATA, 3×760 less 87 or 2,193 mm Hg although ventilatory inefficiency reduces this to about 2,000 mm Hg.

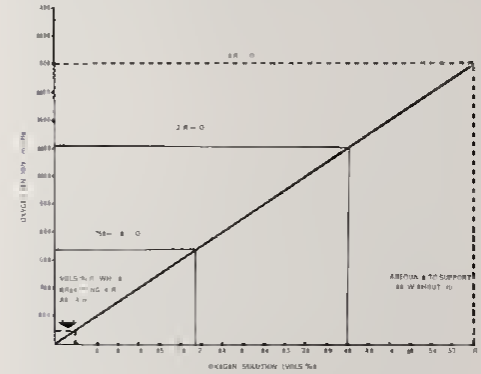


Figure 3 *To illustrate Henry's Law*

Hyperbaric physiology would therefore appear to promise a favourable response to hyperbaric oxygen therapy. However Lambertsen *et al* (1953) drew attention to the considerable gap between the vast increase in the partial pressure of oxygen in the arterial blood which they achieved by hyperbaric oxygen therapy at 3·5 ATA in twelve normal men and the very modest rise (3% per cent) in the mean total oxygen content of the arterial blood at that pressure. The *total* oxygen content of the arterial blood is the sum of the oxygen carried by the haemoglobin of the red cells plus the amount of oxygen physically dissolved in

the plasma. If the patient is a normal healthy male breathing air at 1 ATA, these values are 1·5 and 0·3 volumes per cent respectively (Rees, 1967) *i.e.* a total of 1·8 volumes per cent. If the patient now breathes oxygen at 3 ATA these values become 20 and 6 volumes per cent respectively *i.e.* a total of 26 volumes per cent representing a 38 per cent increase in the total oxygen content of arterial blood. Thus in situations where the partial pressure of oxygen is more important than the total oxygen content hyperbaric therapy offers most prospect of success.

TECHNIQUES OF HYPERBARIC OXYGEN ADMINISTRATION

Oxygen may be given under pressure either by creating a pure hyperbaric oxygen environment or by providing an ambient atmosphere of hyperbaric air the patient breathing oxygen through a face mask. No mask is a hundred per cent efficient but Ledingham *et al.* (1965) have shown that the mask designed by the R.A.F. Institute of Aviation Medicine which is moulded to the face and has a one-way expiratory valve and low pressure demand regulator achieves 90 per cent of the possible maximum performance with no sacrifice of patient comfort as compared with the 60 per cent performance of a standard B.L.B. mask.

Modern therapeutic chambers vary in size from small one man chambers to large units capable of treating several patients at a time while hyperbaric operating theatres exist in such centres as Amsterdam Glasgow Aberdeen and Duke University. One man chambers are ideal, provided that the patient does not suffer from claustrophobia is conscious and co-operative requires no nursing attention during the two hours or more at pressure and is encumbered by no bulky supporting apparatus. Otherwise he must be treated in a large unit where the surgeons anaesthetists and nursing staff run the greater risk. Since they are breathing air decompression may result in one of the forms of decompression sickness from which the patient is protected because he is breathing oxygen. The patient, however, must be capable of wearing a tight fitting mask and injuries or malignancy involving the head and neck would preclude this.

HAZARDS OF A HYPERBARIC ENVIRONMENT

Royal Navy medical officers are familiar enough with the problems of diving to appreciate the risks that may be incurred during the decompression phase by surgeons anaesthetists and nursing staff attending a patient in a large compression chamber. They have been well reviewed by Professor Walder (1966) who is chairman of the Medical Research Council's Panel on Decompression Sickness and by Surgeon Commander Elliott (1967 1968). The various syndromes result from air or nitrogen bubbles appearing in the tissues or blood vessels which give rise to the bends causing pain in the region of large joints angina if the coronary vessels are affected, the 'chokes' if the lungs are involved and the staggers or even paraplegia when the central nervous system is implicated. If a lung cyst or emphysematous bulla is ruptured a pneumothorax results. Walder has shown that splitting of the interalveolar septa of the lung can occur during decompression involving a small pulmonary vein and that air embolism may therefore account

for the various manifestations of decompression sickness In the long term there is also the danger of caisson disease of bone (McCallum *et al* 1966) and a search for such lesions amongst naval divers is currently being conducted by Surgeon Commander J A B Harrison and Surgeon Commander D H Elliott It is therefore important that workers in compressed air environments should have the preliminary medical examination suggested by Brown and Smith (1965) general physical examination including the ear nose and throat, chest X-ray radiological skeletal survey E E G haemoglobin and urinalysis Walder (1966) points out that susceptibility to decompression sickness increases with age (over 40) the amount of adipose tissue and the interval between compressions and he draws attention to the work of Poulten *et al* (1964) on nitrogen narcosis known to divers as the narks He suggests that surgeons breathing air at a pressure of 2 ATA or more could well suffer intellectual impairment which might influence clinical judgment Welham (1965) has recorded personal experiences

The risk of fire in a chamber pressurised to 3 ATA with air is not much greater than at atmospheric pressure (Purser 1966) and it does not appear that the hazard is significantly increased if the patient breathes oxygen while the chamber is compressed with air (Denison *et al* 1966) However the situation is quite different when the chamber is compressed with oxygen the usual procedure with one-man chambers Denison *et al* (1966) have painted a fearsome picture of the risks to man deduced from their experimental work on pigs (Denison 1966) They have shown that under these conditions propagation of the flame by the skin hair and the trap of clothing causes similar incons combustion of the edges of the material and multifold increase in the rate of burning Sweat grease or petrol increase the ignition risk and fire proofing of clothing with borax and boric acid or Proban diminish it They recommend that patients should wear uniformly tight-fitting light weight single-layered open-weave fire-proof garments They also suggest that the chamber should be fitted with a Fignatelli type automatic flame detection system and a water-sprinkler system capable of providing a spray density of 5 ml per minute per square centimetre within 2 seconds of ignition In addition they found that an open ended hose was required to protect groins and axillae The inference of course was that patients should be compressed with air and breathe oxygen through a mask

On the other hand Purser (1966) writing in the same journal observed that in radiotherapy, a mask would increase the pCO_2 level and the danger of convulsions He concluded that in radiotherapy with hyperbaric oxygen delivered in the one-man chamber the fire risk was negligible provided that the patient was suitably clothed lay on antistatic rubber was earthed and that electrical leads were excluded In this connection Purser showed that in oxygen the minimum ignition energy lies between 1 and 10 millejoules and he found no difference between oxygen at 1 ATA and 3 ATA While this energy could be reached by static build up it could also be avoided by normal precautions However, he warned against the increasing use of electrical wiring for monitoring purposes and suggested that these be restricted to essential leads for minimum transistorised equipment.

These then are the chief hazards, but there may be others such as 'spot heating' causing bubbles in the envelope and a risk of explosion or release of gases from monitoring components *e g* from rubber foam (Innes 1968) Safety there must be and the *Ad Hoc* Committee on Hyperbaric Oxygenation of the American National Academy of Sciences (1963) has made important recommendations regarding the operation of hyperbaric chambers It is nevertheless important to recognise that these chambers have been subjected to exhaustive testing and provided that normal precautions are taken and the chambers are operated according to the manufacturers' instructions the risks involved are probably no greater than those to which patient and operating team are exposed daily in most operating theatres

Care of course must be exercised in the choice of anaesthetic agents if operations are contemplated in the large chamber No satisfactory method appears yet to have been developed of calibrating flow meters accurately for a hyperbaric environment and the anaesthetist must depend upon careful clinical evaluation and accurate monitoring throughout the anaesthetic Steps must also be taken to avoid loss of compression in cuffed tubes during the compression phase of the cycle and rupture during decompression Behnke and Saltzman (1967) reported that haemodynamic instability resulting from halothane anaesthesia under hyperbaric conditions may have been responsible for the subsequent morbidity and even mortality of some of their patients They advocated a mixture of 20 per cent nitrous oxide and 80 per cent oxygen It was in fact Paul Bert who first pointed out the advantages of nitrous oxide anaesthesia in a hyperbaric environment, but Vermeulen Cranch (1964) of Amsterdam has warned that rapid decompression would invite disaster because of the appearance of nitrous oxide gas bubbles in the circulation For that reason he uses fluothane in a fluotec vaporiser McDowell *et al*, (1964) on the other hand believe that chloroform anaesthesia is to be preferred because of the cerebral vasodilation it induces and which interestingly enough does not appear to add to the danger of oxygen toxicity It should therefore hold out possibilities in the management of head injuries Muscle relaxants do not appear to be affected by a hyperbaric environment

All patients whether compressed in air or oxygen may suffer from barotrauma or sinus pain and some authorities such as Churchill Davidson have advocated routine myringotomies but most people would consider this unnecessary

There remains the problem of oxygen toxicity Unfortunately most of the findings have been reported in laboratory animals which are known to be much more sensitive to an excess of oxygen than man Haugaard (1968) drew attention to the lag period following exposure before symptoms develop and the readiness with which toxic effects could be reversed by return to atmospheric pressure He suggested that these phenomena supported the hypothesis that oxygen excited its toxic effects by the oxidation of enzymes or cofactors essential to tissue metabolism and produced experimental evidence to prove his point Chance *et al* (1965) reported about the same time that oxidation of reduced pyridine nucleotide was responsible for these reversible toxic effects The pulmonary effects of oxygen

toxicity have not been confirmed at post mortem in man but pulmonary irritation with substernal pain and an increasing degree of dyspnoea does occur. The pO and duration of exposure are the determining factors for the production of toxicity and 24 hours continuous exposure to 100 per cent O at sea level has caused pulmonary symptoms. At the usual therapeutic levels (oxygen at a pressure of under 3 ATA for 2 to 3 hours) no cerebral effects of oxygen toxicity have been reported in man but it is important to avoid a build up of carbon dioxide in the chamber which overcomes the protective vasoconstriction effect of oxygen upon cerebral blood vessels and Marshall and Lambertsen (1961) have shown that there is an increased tendency to convulsions under such conditions. On the other hand prolonged oxygen therapy in patients whose cerebral function is adjusted to chronic hypoxia may lead to drowsiness, confusion and coma (Patterson *et al* 1966) and this happened to one of our patients.

Finally Ballentine (1966) has drawn attention to three types of ocular lesion in experimental animals exposed to raised oxygen tensions: retrolental fibroplasia, selective necrosis of the visual cell layer of the retina and symmetrical degeneration of axons in the ganglion cell layer of the retina. They should sound a note of warning to those still enthusiastic about the resuscitation of neonates by hyperbaric oxygen for it is the infant who is at risk.

THE HYPERBARIC UNIT, ROYAL NAVAL HOSPITAL HASLAR

It was natural that a Service predominantly occupied with research into the problems of underwater medicine should explore the possibilities of the new therapy and the Medical Director-General (Naval) appointed a committee to consider the advisability of establishing a unit for high pressure oxygen therapy at Haslar which reported in December 1963 that it had been unable to establish enough evidence to support such a project at that time, although it acknowledged that hyperbaric oxygen appeared to have an important role in the management of carbon monoxide poisoning and gas gangrene and as an adjunct to radiotherapy. It observed that this was a time-consuming technique requiring high calibre nursing and technical staff and suggested that a one man chamber had advantages in this respect.

The increase in civilian diving accidents then led to consideration of facilities for the treatment of such cases other than in naval technical establishments, particularly if complications required hospital facilities and the advantages of having a unit at Haslar versatile enough to deal with this problem and also provide hyperbaric oxygen therapy was obvious.

In February 1966 during a visit to the Far East one of us became involved in the provision of hyperbaric oxygen facilities for a Gurkha soldier with multiple injuries and traumatic arterial insufficiency of one lower limb following suture of the femoral artery and treatment of associated fractures. A naval one man recompression chamber weighing 580 lb and mounted on skids (fig 4) was fitted with a manifold in H.M. Dockyard, Singapore, to enable two oxygen cylinders to be coupled together in such a manner that empty cylinders could be changed without reducing oxygen flow. It had limitations for routine therapy but

nevertheless has proved to give yeoman service in the Far East where it has been used successfully for the treatment of a variety of hypoxic states

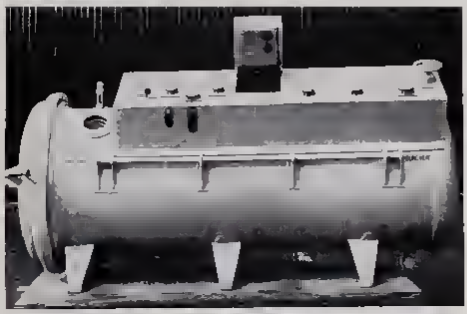


Figure 1 The Vickers Recompression Chamber

This experience indicated the importance of having light-weight air portable one-man hyperbaric oxygen chambers available in theatres of war to treat this type of patient British Forces had been fortunate during the Borneo campaign in seeing none of the gas gangrene which has been a problem to the Americans in Vietnam because of the widespread use there of night soil by Vietnamese peasants Nevertheless it was evident that the peace keeping role of the Royal Navy might at any time require a Royal Marine Commando to be landed from a carrier in terrain much less favourable to battle wounds than that of Borneo The all-metal naval chamber was robust enough but cumbersome to handle and much too heavy for easy transport by air It was hot in the tropics patients were uncomfortable in it and its ports were too small to permit adequate observation of the patient while its communication system was unsatisfactory for ill and enfeebled patients The Vickers one man chamber was lighter and its double, transparent plastic cylinder overcame the problem of patient observation and to some extent the claustrophobic experience of those under treatment However the cast iron ends were heavy — the chamber and its console together weigh 1 264 lbs — while its closed circuit oxygen recirculation and humidity systems depending upon a sophisticated electrical console rendered it too complicated for everyday casualty use although we liked its safety features stressed frame and undercarriage and its facilities for intravenous infusion and patient monitoring Scratching in transport leading to weakness in the outer plastic cylinder is a potential hazard although the double hull is a safeguard and while the chamber

can be operated manually it is rather dependent upon skilled m[illegible] by the firm [illegible] come by in desert or jungle! Nevertheless, the Vickers chamber provides the most comprehensive single chamber facilities for hyperbaric therapy in hospital (fig. 5).

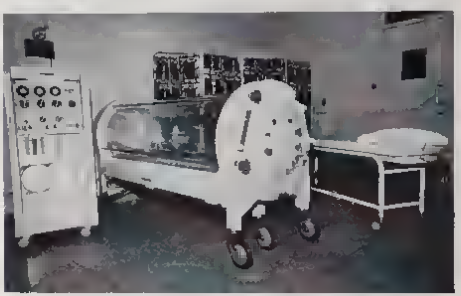


Figure 5 [illegible] Chamber [illegible]

After examining all the available one man chambers that which appeared to meet most nearly our naval requirements was the Normalair unit developed by Smith and Norman (1966) and the firm supplied a prototype for testing at Haslar. It consisted of a compact fibreglass chamber shaped like a horizontal test tube the open end of which was closed by a detachable perspex dome protected by a metal guard and supported on a rigid undercarriage (fig. 6). Through avoiding a re-circulation circuit economy was sacrificed for simplicity to achieve a free oxygen flow which we vented to the exterior of the building in order to avoid oxygen concentration in the room. Since the chamber was manually controlled in dependent of electrical circuitry readily air portable and virtually sailor proof it appeared to offer the ideal unit for the modern casualty situation. Experience, however revealed snags and following clinical trials we recommended modifications which have now been included in the Mark II Normalair chamber (fig. 7). These include a pressure capability of 3 ATA. facilities for pressurising with air or oxygen the replacement of the wheeled chassis by skids for air transport and a separate wheeled cradle for easy movement of the unit within the hospital or sick quarters access plates for monitoring facilities a sampling point for monitoring exhaust gases and height adjustment to facilitate patient transfer to and from trolleys. The rather flimsy metal band and V clamp used to secure the Mark I chamber has now been replaced by a robust interlocking bayonet device. The chamber weighs only 210 lbs without the trolley and can be readily transported

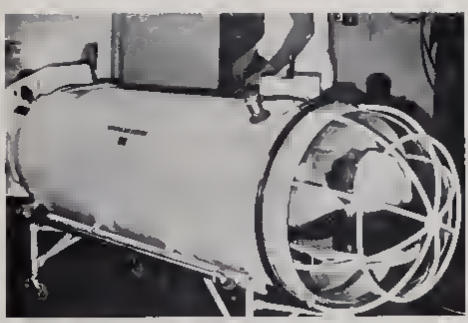


Figure 6 Navy Mark II Chamber

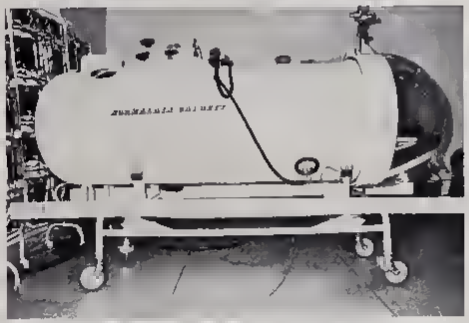


Figure 7 The Mark II Navy chamber showing the double doors and sliding tracked trolley

by ambulance, train, elevator or by air. It has been subjected to exhaustive pressure tests and following the Apollo disaster at Cape Kennedy (Apollo 1967) which caused the death of three astronauts in a space capsule with oxygen at a pressure of 16 p.s.i.g. the communication system has been redesigned and totally

exteriorised An additional safeguard against the risk of explosion has been the provision of a double perspex dome at the head end Unfortunately the protective metal guard which was a feature of the Mark I model has been omitted from the Mark II version and it is doubtful whether sufficient care would be taken in out of the way brittle areas to ensure that the perspex domes are not scratched All perspex scratches easily and there may well be an additional problem with domed perspex since the internal pressures may tend to open up small grooves although on the other hand pressure distribution may be more satisfactory over the surface of a dome Scratching of the inner dome of one of our chambers was traced to damage by the stretcher not being fully run home The ends of this assembly have now been padded, but the greatest care has to be exercised in both the handling and the cleaning of perspex parts Solvents and inflammable materials are avoided and it is probably advisable to use an antistatic spray Further modifications in the instrument panel will be required but they are of a minor nature

In 1966 provision was made for a major hyperbaric unit in Haslar and a versatile chamber capable of being used as an operating theatre for multipatient therapy or for the single ill case requiring medical attention throughout treatment was designed in association with Normalair who built the chambers at Glasgow and Aberdeen However it was clear that enthusiasm for operating in hyperbaric theatres had waned and indications were limited In fact most hyperbaric theatres in this country and elsewhere appear to be used mainly for experimental work The Superintendent of the Royal Naval Physiological Laboratory had from time to time kindly provided large chamber facilities in special cases and the expertise of his staff has always been freely available to us It was therefore clear that one of the large naval chambers would meet our basic requirements for therapy and as a first step a four man chamber has been acquired When the final unit is built as an extension of the new casualty department in Haslar it is hoped to acquire a larger chamber which will then take care of the patient requiring constant attention

The Haslar unit consists of a chamber room (fig 8) preparation room and small laboratory Stringent safety precautions are rigidly enforced There is an antistatic terazzo floor throughout and the walls are painted with a durable gloss paint. Staff are trained in the technique and wear cotton uniforms cotton caps an antistatic rubber-soled canvas shoes The patient is stripped, greasy dressings discarded and surplus grease removed. His hair is washed in detergent solution and a suitable antiseptic detergent is used on his skin He then dons a single layer, fire-proofed cotton garment marked by a conspicuous motif and bound at the ankles and wrists Steps are taken to ensure that he discharges static before he enters the chamber- the humidity of which is maintained at 65 per cent He is clinically assessed before and after each compression special attention being given to the ears and valsalva assessments are made Where necessary an E.N.T opinion is sought regarding decongestants myringotomy or the insertion of a grommet in a patient with past or present ear disease The reactions of the patient during compression are carefully recorded and a medical officer is always

present during the compression and decompression phase of treatment He is also immediately available at other times The non-recirculatory chambers are vented to the outside air and fire precautions have been approved by the Area Fire Officer H M Dockyard Portsmouth They include hoses at the ready Patients are required to sign a form of consent before undergoing hyperbaric oxygen therapy

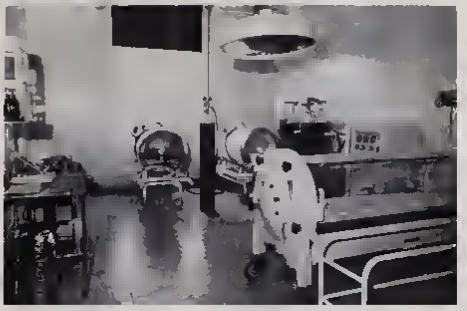


Fig 8 *Interior of the Hyperbaric Unit at the Royal Naval Hospital Haslar*

RESULTS OF TREATMENT

Twenty-eight cases were treated in the Haslar Unit or in the large chambers of the Royal Naval Physiological Laboratory during the eighteen months from May 1966 to November 1967 as shown in table 2 which represents the results of 435 compressions involving 946 hours 47 minutes of hyperbaric oxygen therapy at 2 ATA except in cases 21 and 22 who received oxygen at 3 ATA

It will be seen that our cases fall into four broad groups traumatic ischaemia gas gangrene, pyogenic infections and peripheral vascular disease Hyperbaric facilities have not been requested for cases of carbon monoxide poisoning which have been treated by routine medical measures.

As it happened our first case was a typical ring injury the skin of the affected finger being divided throughout its circumference (fig 9) yet fig 10 26 days later, merely revealed a thin fibrous circumferential scar the patient having regained full movement Three cases in this group were unable to tolerate hyperbaric therapy and treatment was discontinued but all other cases achieved a primary healing without skin loss

Our [illegible] have become interested in the technique of [illegible] synthesis in NO (Muller 1963 Muller *et al* 1965) because it appeared to offer a solution to the problem of the foreign invalid with an ununited fracture who had already spent much time in plaster. Battle casualties and road accident cases treated primarily in hospitals abroad are eventually transferred to Haslar by casevac air ambulance and an alternative to further prolonged immobilisation in plaster was obviously desirable if many of these

Figure [illegible] *ring fix[illegible] distal cor[illegible] adequacy*

patients were to be rehabilitated to full duty in the Service. Since this form of internal fixation permits immediate post-operative movement without external immobilisation our naval orthopaedic surgeons have been trained in this technique in Switzerland. However, unlike the Swiss who perform their meticulous surgery through the skin of healthy skiers, our surgeons are presented with the multiple scars of gunshot wounds, often recently infected and often requiring further skin cover before the definitive operation to fix the bone. It is vital that following A.O. plating the skin should not break down if the benefits of the method are to be realised. The serous leak which heralds such an event has been a clear indication for hyperbaric therapy in these cases. The devitalised flap of a compound fracture dislocation of the ankle treated by compression screwing (case 3) was saved by hyperbaric oxygen and the wound soundly healed twenty six days later. It was necessary to abandon therapy in case 5, who suffered from chronic bronchitis and emphysema, on account of the adverse effects of oxygen upon his hypoxic drive, while bilateral haemotympanum put an end to therapy in case 9.

Fig. 10.1 [illegible]

Four cases were sent to us from hospitals elsewhere with a diagnosis of gas gangrene, but we were able to confirm a Clostridial infection in only two of these (cases 10 and 11) in which Cl. Welchii was isolated. Another (case 21) yielded pyocyaneous proteus and aeromonas liquefaciens on culture and the other (case 22), staph. pyogenes. The two cases with Cl. Welchii infection were received rather late with established gas gangrene on admission hyperpyrexia (105°F), rapid pulse rate (160+), profound toxaemia, cerebral confusion, foul serosanguinous discharge from operation wounds overlying the bones of the involved lower limb and radiological evidence of clostridial myositis (fig. 11). Case 10 had jaundice. Both cases were treated initially by hyperbaric oxygen, a total daily dose of 80 mega units of penicillin intravenously and thorough surgical debridement, the wounds being left open. The penicillin was reduced progressively as the patient improved a total of between 450 and 500 mega units being required. In each case dramatic improvement followed the first 2½ hour period of hyperbaric oxygen, the temperature and pulse rate falling steeply and mental confusion disappearing. Crepitus disappeared from the tissues within 48 hours.

In the group of pyogenic infections four cases were unable to tolerate hyperbaric oxygen requiring treatment to be abandoned but early wound healing was achieved in all others. In case 14 a later sinus developed requiring the removal of a fragment of dead bone after which healing was permanent.

The only successes in the group suffering from peripheral vascular disease were minor ones and were seen in cases 24 and 28 whose unhealed amputation stumps responded to hyperbaric therapy after 65 and 13 hours respectively.

Figure [illegible] *muscle pl*[illegible]

DISCUSSION

It is important to emphasise that selection of patients was governed entirely by our joint conviction that hyperbaric therapy was in the best interest of the patient and that no other form of therapy could have been expected to benefit to the same extent. It is one thing to carry out controlled trials in experimental animals but it requires a detachment we do not feel we possess both to withhold therapy from patients who might deteriorate without it and to offer this technique to patients who could be expected to do equally well from alternative methods and without the discomfort it occasionally entails. We therefore abandoned hyperbaric therapy for the complications of peripheral vascular disease as soon as it became evident that our results were no better than those of others in this field but we persisted in the treatment of staphylococcal infections because we were satisfied that hyperbaric oxygen averted potential disaster, months of invalidism and often the loss to the Service of valuable trained personnel.

Traumatic arterial ischaemia appears to be the indication *par excellence* for hyperbaric oxygen. At 3 ATA a temporarily impaired circulation can carry sufficient oxygen dissolved in the plasma to maintain adequate tissue oxygenation until oedema subsides, haematoma is absorbed, collateral channels open up or capillary perfusion returns to normal. Shock, vascular injury, fractures and severe soft tissue injury complicate the wounds of modern warfare and, while hyperbaric therapy is no substitute for adequate fluid replacement, the correction of metabolic acidosis and skilled surgery, it may nevertheless prove to be the factor in the patient's post operative course which saves a limb or vital skin flap (figs. 12 and 13).

We have been gratified to find that the varying degrees of sepsis associated with the break down of devitalised and poor quality skin overlying bones treated by compression plating, have responded rapidly to hyperbaric oxygen and wound

Figure 12. *Unwise primary suture of mutilated skin flap, resulting in ischaemia of margins*

FIGURE 1. Skin flap healed without [illegible] oxygen

healing has been rapid and permanent. The role of hyperbaric therapy in pyogenic infections is difficult to assess in view of the impossibility in obtaining a comparable control group but McAllister *et al.* (1965) have shown that oxygen at 2 ATA is toxic for all organisms although bacteriostatic rather than bactericidal and that it potentiates the effects of antibiotics. They studied streptococci, staphylococci, coliforms, pseudomonas pyocyanens and proteus as well as the yeast candida albicans and the fungus aspergillus. As might be expected they found that organisms had a variable susceptibility, pyocyanens being specially sensitive. However it is to be noted that organisms were found to change their morphology and metabolism under hyperbaric oxygenation and this may carry important implications. Slack *et al.* (1965) have claimed striking success in treating pyogenic infections of bone but there have been few other observations along this line. However we had a reasonable yardstick by which to measure the success of our own hyperbaric oxygen therapy in the treatment of pyogenic infections since six of

one case including one ski injury treated in Switzerland and transferred to us developed infections following A O plating. Normally this would have spelt a period of prolonged morbidity with the loss of internal fixation yet the wounds of all who tolerated hyperbaric therapy healed rapidly and the underlying fractures united soundly. By contrast the two cases (17 and 20) who refused to accept this treatment had prolonged morbidity.

At the time we received our cases of gas gangrene we had available only our prototype one man chamber with a pressure capability of 2 ATA and Brummelkamp (1965) has suggested that a pressure of 3 ATA is necessary to inhibit the production of alpha toxin and kill the bacteria although McAllister *et al.*, (1965) showed that 2 ATA was toxic for both aerobes and anaerobes alike. It might well be claimed that our results are no better than if we had depended entirely upon massive intravenous antibiotics and excision of dead muscle. However the remarkable recovery from the effects of toxaemia followed in each case immediately upon the first hyperbaric oxygenation and before debridement had been carried out or the full effects of antibiotic therapy had been achieved. Moreover while resolution continued steadily thereafter it failed to provide the spectacular graphic evidence of the initial records. This is a common experience and Brummelkamp quoting the work of Maclennen *et al* (1945) attributes it to the fact that as the anaerobic bacteria are rapidly killed and no new alpha toxin is formed the alpha toxin already in circulation is rapidly fixed and eliminated. We are confident that hyperbaric oxygen will enable the inevitable amputations to be carried out at a lower level than would otherwise be the case. For instance it was possible to perform a through knee amputation in case 10 (figs 14 and 15) although his cellulitis had extended to mid thigh level (fig. 16) and indeed hyperbaric oxygen may well have saved this patient's life. The line of demarcation which subsequently developed between the non-viable tissues and those which recovered is illustrated in case 11 (fig. 17). The degree of recovery permitted a below knee amputation (fig. 18). Provided therefore that such cases are received in time to strike a lethal blow at the infecting anaerobic organisms before they have succeeded in destroying enough muscle to make amputation inevitable, hyperbaric oxygen at 3 ATA in conjunction with massive intravenous penicillin and surgical debridement, offers excellent prospects of saving both life and limb.

Cases suffering from peripheral vascular disease did not greatly benefit from hyperbaric oxygen and the results in this group were as disappointing as those reported by others. The Buergers cases did as badly or worse than the atherosclerotics and in the former sympathectomy appeared to make no difference, while rest pain was sometimes relieved and occasionally made worse. This is a little surprising in view of the excellent results from hyperbaric oxygen upon hypoxic tissues resulting from the reduced arterial flow in traumatic ischaemia and the condition may well be analagous to the lost hypoxic drive in chronic bronchitis and emphysema. Much more work is required on the peripheral blood flow and it is to be noted that Bird and Telfer (1965) have shown that oxygen at 2 ATA can cause a 28·5 per cent reduction in the resting forearm blood flow. Their results

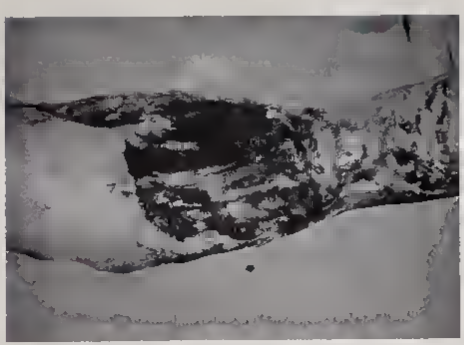


Figure 14 Case 10 *Gas gangrene of lower limb*

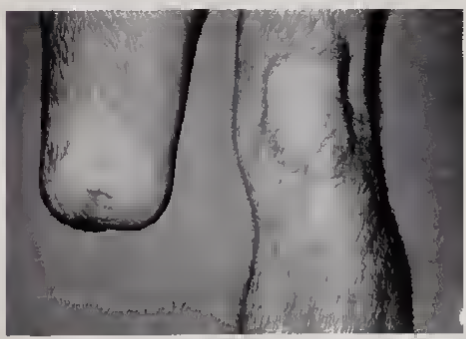


Figure 15 Case 1 *Herpetic amputation*

Figure 16 Case 11. Chromatid cellulitis extending to mid thigh level.

Figure 17 Case 11. [illegible] pug at ankle level, [illegible] signal clearing [illegible] perbaric oxygen therapy.

Figure 18 Case 11 *Below knee amputation*

however were not entirely consistent and more work on limb blood flow is required to determine the reason why hyperbaric oxygen appears to oxygenate tissues rendered hypoxic by the temporary occlusion of healthy arteries yet fails to relieve the symptoms of patients with chronically occluded vessels If hyperbaric therapy has any place at all in peripheral vascular disease it is to assist the healing of indolent ulcers, wounds and amputation stumps (figs 19 and 20)

THE FUTURE OF HYPERBARIC OXYGEN THERAPY

It is not easy at this juncture to determine where hyperbaric oxygen therapy is going but there can be no doubt about its value in such conditions as carbon monoxide poisoning gas gangrene traumatic arterial ischaemia and cold injury It also has a place in the treatment of pyogenic infections in which there is an element of anoxia and in chronic varicose ulcers It will not, of course avoid the necessity for ligation of incompetent communicators and skin grafting but it may well guarantee the success of these procedures Drew and his co workers at Westminster Hospital (1968) have recently claimed the superiority of hyperbaric oxygen in the treatment of cases of acute myocardial infarction over conventional therapy and more evidence is forthcoming of the value of oxygen under pressure in rendering tumours more sensitive to the effects of X rays It is however to be noted that neutrons do not suffer from the same disadvantage as X rays in this respect and when bombardment of the anoxic centre of tumours by neutrons

becomes a recognised mode of therapy hyperbaric oxygenation may no longer have a place in radiotherapeutic techniques

Some interesting results have been reported in the treatment of serious head injuries consciousness being rapidly regained. This is contrary to expectations but it may be that in these conditions spasm of the cerebral blood vessels is abolished while oxygen poisoning does not occur because of the pre existing anoxia However much more work requires to be carried out on this problem before it can be considered an established therapeutic procedure

Hyperbaric oxygen has been used to treat burns and there appear to be good reasons for doing so since we know that oxygen under pressure is lethal to all organisms and particularly to the pseudemonas which provides one of the greatest problems in the management of the late infections of extensive burns Furthermore Sachs (1968) has shown recently that these organisms are often found at some depth from the surface and therefore not eradicated by surgical debridement prior

Figure 20. *Slow healing under light crust after prolonged hyperbaric oxygen*

to grafting. It therefore appears that hyperbaric oxygen might prove particularly rewarding under these circumstances and we have recently treated a heavily infected case of extensive burns with complete success.

Finally, there is growing evidence of the value of hyperbaric oxygen in the treatment of shock, particularly bacteraemic shock, and this should be of interest to all Service surgeons. Hardaway's (1966) concept of disseminated intravascular coagulation and the work of Hershey and Altura (1967) on the use of vasodilators acting through the adrenergic receptors with PLV-2, a synthetic vasopressor acting directly upon the arteriolar wall, have led to much more aggressive attitude towards the treatment of hypovolaemic shock. However, massive transfusion, central venous pressure monitoring, low molecular weight dextran, the appropriate vasopressor and vasodilator and correction of the metabolic acidosis are still inadequate in many cases. It is in this field that hyperbaric oxygen may well prove its value and the one-man, air portable chamber a life-saving measure.

SUMMARY

1 The history of a therapeutic hyperbaric environment is [illegible] with particular reference to the current use of oxygen under [illegible]

2 Alternative methods of oxygen administration together with the [illegible] hazards of an oxygen-rich environment have been discussed

3 Experiences in the clinical applications of hyperbaric oxygen therapy in the Royal Naval Hospital Haslar have been described and results evaluated

4 The present position of hyperbaric therapy has been reviewed and future trends have been suggested

ACKNOWLEDGMENTS

Our thanks are due to Surgeon Lieutenant Commander J M Young for the hyperbaric therapy undertaken at the Royal Naval Physiological Laboratory, to the Staff of the Royal Naval Hospital Haslar for their conscientious support to Mr L Williams for the photographs to Mrs. Joan Reynolds for secretarial assistance and the New York Academy of Sciences for permission to reproduce figs 1 and 2

REFERENCES

American Medical Association Bureau of Investigation The Cunningham tank treatment (1928) *J Amer med Ass* **90** 1494

Apollo 204 Third Report (1967) *Flight International* **91** 374

Ballentine, J D (1966) *New Engl J Med* **19** 1038

Barrie, H and Miller G (1966) *Lancet* **2** 1394

Behnke A R and Saltzman H A (1967) *New Engl J Med* **276** 1423

Bert P (1878) *La pression barométrique* Masson Paris

Bird, A D and Teleb A E M (1965) *Hyperbaric Oxygenation* Proceedings of the Second International Congress Ed Ledingham I M E & S Livingstone Ltd Edinburgh and London p 424

Blair E Gillogart R Attar S and Cowley R A (1965) *Amer J Surg* **110**(3) 348

Boerema I Kroll, J A Meijne N G Lokin E Kroon B and Huiskes J W (1956) *Arch chir neerl* **8** 193

Boerema I, Meijne N G Bakkenkamp W K Bouma S Mensche M H Kamermans F Stern H M and Aalderen W von (1960) *J Cardiovasc Surg* **1** 133

Boerema I Meijne N G and Vermeulen Cranch D M E (1962) *Surgery* **52** 796

van der Brenk H A S Madigan J F Kerr R C Cass N Richter W and Torkens L (1966) *Hyperbaric Medicine* Proceedings of the Third International Congress Ed Brown I W and Cox B G National Academy of Sciences National Research Council p 653

Brown I W and Smith W W (1965) *Ann N Y Acad Sci* **117** 801

Brummelkamp W H (1965) *Hyperbaric Oxygenation* Proceedings of the Second International Congress Ed Ledingham I M E & S Livingstone Ltd Edinburgh and London p 239

Brummelkamp W H Hogendijk J and Boerema I (1961) *Surgery* **49** 299

Chance B Jamieson D and Coles, H (1965) *Nature* **206** 257

Churchill-Davidson I Sanger C and Thomlinson R H (1955) *Lancet* **1** 1091

Clinical Application of Hyperbaric Oxygen Proceedings of the First International Congress (1964) Edited by Boerema I Brummelkamp W H and Meijne N G Elsevier Publishing Co Amsterdam London and New York

Denison D M Evensting, J and Cresswell A W (1966) *Lancet* **2** 1404

Denison D M (1966) *Research in Burns* Ed Wallace A B and Wilkinson A E & S Livingstone Ltd Edinburgh and London p 41

Donald K W (1946) Admiralty Experimental Diving Unit, Report No XVI

Donald K W (1947) *Brit Med J* **1** 667 712

Drew C (1968) Unpublished data

Elliott D H (1967) *J Bone Jt Surg* **49b** 588

Elliott D H (1968) *J roy nav med Serv* **54** 4

Fontaine, J A (1879) Emploi chirurgical de l'air comprimé *Un Med Prat franç* **28** 448

Forster R E (1967) *New Engl J Med* **276** 730

GRAY L. H CONGER A D. EBERT M HORNSBY S and SCOTT O C A (1953) *Brit J Radiol* **26** 638
HALDANE J S (1895) *J Physiol* **18** 201
HARDAWAY R M (1966) *Syndromes of disseminated intravascular coagulation* Charles C Thomas, *Publisher* Springfield Illinois USA
HAUGAARD, N (1965) *Ann N Y Acad Sci* **117** 736
HENSHAW J J (1664) *Reported by* Simpson, A (1857) in *Compressed Air as a Therapeutic Agent* Sutherland and Knox Edinburgh p 40
HERSHEY, S G and ALTURA, B M (1967) *Comparison of Noradrenaline Angiotension and Oxidiprasin (PLV 2) on the Microcirculation and Survival after experimental shock* Intermediate International Medical Defence Symposia Uppsala
HITCHCOCK, C R, HAGLIN J J., TELANDER, R. L., SHAPIRO, F L., and SIMSO J A. (1965) *Arch Surg* **91** 307
HUTCHISON J H KERR M M MCPHAIL M F M DOUGLAS T A SMITH G, NORMAN J N and BATES E H (1962) *Lancet* **2** 465
HUTCHISON J H KERR M M WILLIAMS K G and HOPKINSON W L (1963) *Lancet* **2** 1019
Hyperbaric Medicine Proceedings of the Third International Congress Duke University Durham N.C., USA (1967) Ed Brown I W and Cox, R G National Research Council No 1404
Hyperbaric Oxygenation Proceedings of the Second International Congress (1965) Ed Ledingham I M E & S Livingstone Ltd Edinburgh and London
Hyperbaric Oxygenation Potentialities and Problems Report of the *Ad Hoc* Committee on Hyperbaric Oxygenation (1963) National Academy of Sciences National Research Council Washington DC
ILLINGWORTH C. F W (1962) *Brit med J* **2** 1271
ILLINGWORTH C F W (1965) *Ann N Y Acad Sci* **117** 671
INGVAR D H LASSEN N A (1962) *Acta physiol Scand* **54** 325
INNES G S (1968) *The predilection and hazards of a hyperbaric oxygen environment* Meeting of the Liaison Committee for Sciences Allied to Medicine and Surgery University College, London
JACOBSON J H MORSCH J H C and RENDELL BAKER L (1964) *Clinical Application of Hyperbaric Oxygen* Proceedings of the First International Congress Amsterdam 1963 Ed Boerema I Buurmeikamp W H and Meijne, N G Elsevier Publishing Co., Amsterdam London and New York p 7
JUNOD, V T (1834) *Rev méd franç* **3** 350
LAMBERTSEN C J KULGH R H COOPER D Y EMMEL S L. LOESCHCKE H H and SCHMIDT C F (1953) *J appl Physiol* **5** 471
LAVOISIER A L (1783) *See Ray Med Pelis* **5** 569
LEDINGHAM I M McDOWALL D G JACOBSON I and NORMAN J N (1965) *Hyperbaric Oxygenation* Proceedings of the Second International Congress Ed Ledingham I M E & S Livingstone Ltd Edinburgh and London p 105
MCALLISTER, T A STARK J M NORMAN J N and ROSS R M (1965) *Hyperbaric Oxygenation* Proceedings of the Second International Congress Ed Ledingham, I M E & S Livingstone Ltd Edinburgh and London p 250
MCCALLUM R I WALDES, D N BARNES, R CATTO M E, DAVIDSON J K., FRYER D I GOLDING F C and EATON W D M (1966) *J Roy Fr Surg* **48** 207
MCDOWALL D G HARPER, A M and JACOBSON I (1963) *Brit J Anaesth* **35** 394
MCDOWALL, D G HARPER A M and JACOBSON I (1964) *Brit J Anaesth* **36** 11
MCEWEN J B (1965) *Ann roy Coll Surg Engl* **36** 168
MARSHALL J K and LAMBERTSEN C J (1961) *J appl Physiol* **16** 1
MULLER M E (1963) *Proc roy Soc Med* **56** 455
MULLER M E ALLGOWER W and WILLENEGGER H (1965) *Technique of Internal Fixation of Fractures* Springer Verlag Berlin Heidelberg and New York
PATTERSON J L. BAKER J P PATTERSALL M A, and STRINGER L. (1966) Unpublished data quoted in editorial of *New Engl J med.* **19** 1073
POULTEN E C CATTON M J and CARPENTER, A (1964) *Brit J Industr Med* **21** 242
PURSER, P R (1966) *Lancet* **2** 1405
REES, G Jackson (1967) *Scientific Foundations of Surgery* Ed Wells, C., and Kyle, J Wm Heinemann London p 128
SACHS A (1968) *Is the bacteriostasis of Sepsis a Preventable Disease* Paper read at Meeting of UK Section of International Society for Burns Injuries
SLACK W K THOMAS D A and PITKINS D (1965) *Lancet* **2** 309?
SMITH J Lorrain (1899) *J Physiol* **24** 19
SMITH G and SHARP G R (1960) *Lancet* **2** 905
SMITH G and LAWSON D D (1962) *Surg Gynec & Obstet* **114** 380
SMITH G (1965) *Ann N Y Acad Sci* **117** 684

SMITH G. IRVIN J. T. and NORMAN J. N. (1966) *Research in Bar[illegible]* J. J. Wallace A. B. and Wilkinson A. E. E. & S. Livingstone Ltd. Edinburgh and [illegible] p. 34

TRIGER M. (1841) Mémoire sur un appareil à l'air comprimé pour le percement des puits de mines et autre travaux sous eaux et dans les sables submergés. *C. R. Acad. Sci.* **13** 884

VERMEULEN-CRANCH D. M. E. (1964) *Clinical Application of Hyperbaric Oxygen* Proceedings of the First International Congress. Ed. Boerema I. Brummelkamp W. H. and Meijne N. G. Elsevier Publishing Co. Amsterdam London and New York p. 205

WALDER D. N. (1966) *Ann. roy. Coll. Surg. Engl.* **38** 288

WELHAM W. (1965) *Ann. N.Y. Acad. Sci.* In Panel discussion **117** 831

A CASE OF BLACKWATER FEVER

By B. Victor Jones, John M. F. Hartley and John R. Robertson

The following case is reported to illustrate the part which modern communications and effective laboratory facilities in ships can play in dealing with cases of grave illness occurring at sea in remote waters.

This incident occurred during the withdrawal of British Forces from Aden when hospital facilities of European standard were no longer available in Aden. An emergency hospital had been set up in *HMS Albion* to provide for the needs of the troops remaining ashore in Aden and for the Naval Task Force which had been assembled in the area.

Case Report

Late in the evening of 17th November 1967 a signal was received from the M.V. *British Architect* requesting urgent medical assistance. This vessel, which carried no doctor, was at the time some 270 miles south of Aden. *HMS London* was immediately sent to her aid and met her at 0430 the next morning. The *London's* medical officer was transferred to the ship and found an extremely ill 36-year-old seaman. He was confused, restless and deeply jaundiced. The history was that seven days previously he had become ill with fever, aching in the limbs and the symptoms of an upper respiratory infection. On the fourth day of the illness he had become jaundiced, with epigastric pain and vomiting of bile-stained fluid. He had passed dark stools several times a day. Despite treatment with penicillin and chloromycetin a hectic fever had continued and his condition had steadily worsened. During the last twenty four hours he had developed hiccoughs and had passed very little urine. Owing to the vomiting he had eaten little and his fluid intake had only been ½-1 pint daily for the past four days. The ship had called at Freetown eight days prior to the onset of the illness.

The patient was immediately transferred to *HMS London* by helicopter and on the return journey to Aden an intravenous drip of 4·2 per cent dextrose 0·18 per cent saline was started. His blood pressure was found to be 100/40 and the haemoglobin under 60 per cent. The stools contained occult blood.

As soon as *London* came within helicopter range the patient and medical officer were transferred to *Albion* arriving on board at 1315. The patient's condition remained very grave. Although he occasionally attempted to speak his speech was unintelligible and no further history could be taken. He showed the rapid hissing respiration of acidosis; the liver was palpable but the spleen was not. A Gibbon catheter was passed and left in, the bladder contained only 5 ml. of brown murky urine. A one-hourly urine output chart was started but in fact the patient excreted no urine at all during the time he was in the ship.

The clinical diagnosis was uncertain. Infectious hepatitis and Weil's disease were among the possibilities considered. It was clear that the answer would depend on laboratory findings which were as follows:

Blood film Malignant tertian malarial parasites were present in very large numbers 10-20 per cent of the red cells containing classical ring forms

Haemoglobin — 6 6 gms. per cent (45 per cent Haldane)

P C V — 19 per cent

W B C — 16 600 Differential count of normal distribution

Clotting Time — This was not formally estimated but it was noted that a specimen taken into a dry bottle took 45 minutes to clot, against a normal time of about 15 minutes

Blood Urea - In excess of 450 mgm per cent.

Urine — Quantities of debris suggesting haemoglobin breakdown products were present The urine was acid but the quantity obtained was too small for any other investigations to be done on it

It was thus established that the diagnosis was severe malaria with gross blood destruction and complete renal failure Quinine HCl 10 mgm was given intravenously Four units of blood taken from a bank which was held in the ship at that time were cross matched and a transfusion started

It seemed clear that a renal dialysis as soon as possible was his only hope of survival there were no facilities for this on board The ship was at sea only about ten miles off Aden at the time but nevertheless communication with the shore was not too easy However a signal was passed to the Senior Medical Officer of Khormaksar Sick Quarters the only shore medical facility remaining in Aden and eventually a two way radio-telephone link established with him He was asked if a peritoneal dialysis set was available locally or if not whether a dialysis team could be flown down from Bahrein for it was feared that the patient might not survive any further travel unless his condition could be improved No dialysis equipment however was available locally but an Argosy aircraft equipped for casualty evacuation was due to take off from Khormaksar for Bahrein at 1930 A stretcher space was held in this aircraft until the last possible moment in case immediate evacuation to Bahrein was considered the best solution to the problem. Meanwhile the remaining R.A F physician in Aden was flown out to the ship to give further assistance

By this time (1700) a decision had to be made urgently After discussion the medical officers decided to accept the flight The balance was swung in favour of this decision by the fact that as no intravenous preparations of sodium bicarbonate or sodium lactate were available on board it was not possible to correct his acidosis, which was felt to be the most urgent necessity

Accordingly yet another night helicopter flight was hastily arranged and at 1845 the patient, accompanied by one of the R A F medical officers and with a transfusion running took off for Khormaksar Three more units of blood were taken along in an insulated container

A flame photometer which had been taken on board ship from Khormaksar that morning had not yet been set up so that it was not possible to obtain serum electrolyte estimations before the patient left for shore However, these were done

as soon as possible with the following results which were later signalled to the R A F Hospital, Bahrein

Serum Sodium	—	132 m e q /litre
Serum Potassium	—	7 0
Serum Chloride	—	105
Serum Bicarbonate	—	13

On arrival at Khormaksar intravenous sodium bicarbonate solution was given and the patient and his escort continued their journey to Bahrein where they arrived some four hours later without further deterioration in the patient s condition

Meanwhile *Albion* had signalled to the R A F Bahrein R A F Hospital Halton and the M O D asking that arrangements be made for an immediate dialysis to be carried out on arrival in Bahrein and requesting that if facilities for this were not available locally the R A F Renal Unit dialysis team should fly out to Bahrein by the first available aircraft In the event, this last step did not prove necessary as facilities were available at a civilian hospital in Bahrein to which the patient was taken Here a 12 litre peritoneal dialysis was carried out and anti malarial treatment continued with chloroquine

Following dialysis serum investigations showed

Serum potassium	—	5 8 m e q
Serum bicarbonate	—	19
Blood urea	—	508 mgm
Prothrombin index		72 "

During the twenty four hours after his arrival in Bahrein 85 ml of urine were excreted

Thirty six hours after arrival in Bahrein he was again emplaned this time in a CASEVAC Britannia bound for the United Kingdom Unfortunately he failed to withstand this last journey dying in the air on the last leg of the flight despite all attempts at resuscitation No post-mortem was done

COMMENTS

Malaria is still a killing disease It was not known whether this man had taken paludrine but it is unlikely because even the resistant strains which have recently emerged in some parts of Africa could scarcely have produced a fatal issue so rapidly In the face of regular paludrine prophylaxis Febrile illnesses occurring in ships which have called at malarial ports must be assumed to be malarial and treated as such until this diagnosis can definitely be excluded this applies particularly to ships without medical officers

A great deal of effort was put into the attempt to save this man s life by the Naval and R A F air and telecommunications branches unhappily without success

This case suggests that while air travel has revolutionised the prospects for recovery in severe illness in out-of-the way places repeated long air journeys are hazardous for very seriously ill patients and are not to be undertaken lightly The aim should be to get the patient to a place where the cause of the immediate crisis

can be dealt with adequately but to delay any further moves until he is out of danger and has had time to recover from the disturbance of his previous travel

It is of interest that this patient showed evidence of deficient blood clotting Devakul, Harinasuta and Reid (1966) have demonstrated abnormal fibrinogen consumption in very severe cases of malaria and suggest that intravascular coagulation may play a part in the pathogenesis of cerebral malaria and might be a causal factor in the mechanism of chloroquine resistance If this were so, thrombolytic and anticoagulant therapy might be life saving in severe P falciparum infections

ACKNOWLEDGMENTS

We wish to thank M Tech(3) A Prodger and W O C Boyd for carrying out so many laboratory tests in such a short time under difficult conditions and our RAF colleagues for all their efforts to help this patient

REFERENCE

Devakul, K Harinasuta T and Reid H A (1966) *Lancet* p 886 Vol 2

VESICO-URETERIC REFLUX IN CHILDREN

by Fergus A. F. Mackenzie

Recurrent urinary tract infection in children may be associated with vesico-ureteric reflux with flow of urine from the bladder into the ureters during micturition. This effect may be transient but if persistent can lead to chronic pyelonephritis (Hodson & Edwards, 1960; Edwards 1960). Ureteric reflux can cause severe renal damage in young children and it is important to recognise it early. Reflux should be considered in any child who has recurrent urinary tract infection which fails to respond to medical treatment. These children frequently fail to thrive and may have enuresis, frequency and dysuria or occasionally haematuria. Intravenous pyelography may be normal or fail to indicate the severity of the lesion which is only fully displayed by the technique of micturating cystography with or without cinephotography. Reflux is not observed in normal children and is a reliable sign of abnormality when present (McGovern, Marshall & Paquin 1960).

De Luca, Fisher and Swenson (1963) examined 1 279 cases of recurrent urinary tract infection in children. Of these 203 showed obstructive uropathy due to anomalies of the urethra, bladder, ureter or pelvi-ureteric junction. The majority showed no obstruction and were the main purpose of the study. Obstructive uropathy predominated in early life (1-3 years) and was commoner in boys. The non obstructive group was also discovered early in life (2·5 years) where the incidence was greater in girls in the ratio 4:1. The overall incidence decreased rapidly after 7 years of age. In a more recent series of chronic urinary tract infection with reflux (Williams & Eckstein 1965) a similar incidence was reported with 25 per cent of cases presenting within the first year of life and 50 per cent from 1-3 years. Lesions were discovered with the following aetiology

Idiopathic non obstructive	45%
Bladder neck obstruction	25
Ureteric duplication	12%
Bladder diverticula	10
Others	8%

Many authors have described the association of hydronephrosis and chronic pyelonephritis with chronic ureteric reflux leading to eventual renal atrophy and death from renal failure in some patients (Hutch, Hinman & Miller 1962; Rosenheim 1963; Steele, Leadbetter & Crawford 1963). There is still discussion as to the mode of infection of the kidneys whether by haematogenous spread by ascending infection of the ureteric lymphatics or by direct flow of infected urine from the bladder. The exact frequency and importance of these mechanisms remain undecided.

The causes of vesico-ureteric reflux may be classified into the following groups (Tanagho & Hutch 1965)

(a) *Primary reflux* This is the most common type No obstruction can be demonstrated at the bladder neck or in the urethra The bladder is not trabeculated The basic defect arises from alteration of the angle of entry of the ureters through the bladder wall which may be due to possible trigonal weakness
(b) *Secondary to neurogenic or obstructive disease* Vesical trabeculation is present
(c) *Reflux secondary to inflammation* In acute or chronic cystitis where oedema of the ureteric orifice may permit reflux This effect may be transient responding to medical treatment with cessation of reflux
(d) *Iatrogenic* following surgical procedures
(e) *Secondary to congenital ureteric anomalies* duplication or ectopic ureters with or without associated ureterocoele

The following patients were seen at the Royal Naval Hospital Malta during the period 1964 66 and have been selected to demonstrate the various types of ureteric reflux The clinical picture and approach to the problem of corrective treatment will be discussed

Case 1 C — A 6 weeks old baby boy was discovered at birth to have an imperforate anus and an additional defect was found in his urinary tract.

An IVP showed severe hydronephrosis mega ureter and mega-cystis, with neurogenic bladder and inefficient emptying

Similar lesions may be found in association with spina bifida and meningomyelocoele (Graf Smith Flake and Van Epps 1964)

Case 2 S D — An 8 year old girl had a non obstructive reflux with associated early chronic pyelonephritis on the right side due to chronic urinary infection The lesion was first discovered when she was 8 years of age Signs on the pyelogram were minimal She was admitted to hospital in November 29 1963

This child was dry at night when she went to Singapore at the age of 2 but subsequently began to have enuresis This tendency persisted and was always worse when she had a cold

On examination she looked unwell her height and weight were 25 per cent less than expected for her age but there were no abnormal physical signs

Investigations showed Urine White Cells increased Cultures *B proteus* Blood Urea 24 mgms Haemoglobin 85 per cent

She was treated with streptomycin and nitrofurantoin Discharged with clear urine

She was readmitted on July 6 1964 as she was making no progress

It was possible to keep her urine sterile on continuous therapy but she had persistent proteinuria still looked unwell and continued to have enuresis Her weight remained static

An IVP performed on July 27 1964 showed that concentration was slightly reduced on the right with a dilated calyceal irregularity and some dilatation of the right ureter Some bladder residue was demonstrated after micturition

A Micturating Cystogram was carried out on July 30 1964 (fig 1) When the bladder was filled a well marked reflux was seen into the right ureter which showed some dilatation Minimal reflux was seen into the left ureter which was normal in calibre The degree of reflux increased during micturition filling up the right ureter to outline the calyceal system

She was transferred to Great Ormond Street Hospital London where a ureteric transplant was performed by Mr James Williams She was re admitted to the Royal Naval Hospital Malta for reassessment on November 1 1965

A Micturating Cystogram performed on November 20 1965 showed after operation there was no reflux at rest with a full bladder During micturition no reflux could be seen The IVP carried out on November 17 1965 showed normal function of the kidneys Concentration was equal on both sides whereas on the right it was slightly reduced on previous films The right kidney was still smaller than the left

Case 3 V R — A 7 year-old boy was admitted on December 22 1964 with a history of painless haematuria for three days passing drops of fresh blood per urethra after each act of micturition He had had vomiting fever frequency and pain in the right loin

An IVP carried out on January 1 1965 showed normal function of the kidneys with no cortical scarring or calyceal deformity No bladder residue was seen after micturition Urine culture demonstrated coli-form organisms blood urea 24 mgms

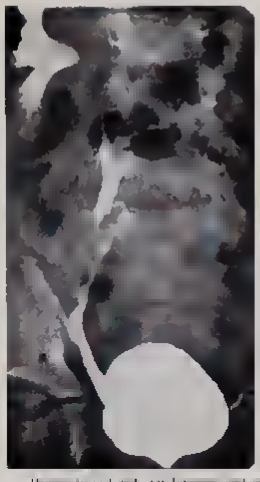


Figure 1 Case 2
Micturating cystogram *Predominantly right sided vesico ureteric reflux Initial excretion pyelography had shown slight dilation of pelvicalyceal system on the right side with dilated right ureter and bladder residue Following initial transplant concentration was equal both sides and no reflux was seen on excretography*

He was treated with intravenous chloramphenicol and the urine was sterile by January 14 1965

A Micturating Cystogram was performed on January 9 1965 and showed that there was slight ureteric reflux at rest which Hulcine was filled On commencement of micturition a definite reflux was seen on the dilated kidney on both ureters and this was more marked on the right

The patient was seen again on February 1966 as an outpatient He was perfectly well and had gained weight and his urine was sterile

A Micturating Cystogram was carried out on February 25 1966 and no reflux was demonstrated when the bladder was filled during micturition

This is a good example of transient ureteric reflux due to oedema of the ureteric orifice which responded to medical treatment

Case 4 S A — A 2 year old boy suffering from chronic pyelonephritis and hydronephrosis with associated reflux This child presented with pain and frequency of micturition for one month prior to admission He also had intermittent vomiting and slight haematuria He had a previous history of chest infection treated in another hospital at 5 weeks and German measles at 5 months

On investigation the urine showed masses of leucocytes with atypical coliform bacilli on culture Blood urea 56 mgms

He was treated with nitrofurantoin

An IVP was carried out on September 9 1964 and the kidneys showed normal function by five minutes Bilateral hydronephrosis with irregular calyceal margins The right ureter was dilated and the bladder was larger than usual and showed a double contour Very little emptying had occurred on the post micturition film

A Micturating Cystogram was performed on January 21 1965 when free reflux was seen up both ureters into the bilateral hydronephrotic kidneys There was poor bladder emptying

[illegible] Ormond Street Hospital London where [illegible] Miss Jessica Williams on October 13 1965 [illegible] Naval Hospital Malta and a Micturating Cystogram [illegible] The bladder [illegible] was still some thickening and [illegible]

[illegible]

[illegible] — A 13-month [illegible] girl She was a full term normal delivery and birth weight [illegible] 7 lbs She was admitted another hospital at the age of 7½ months suffering from [illegible] Subsequently had frequent chest infections and measles She sat unaided at 8 months but was unable to reach the sitting position by herself She had no idea how to use her legs and could not stand She had virtually no speech Weight gain was poor 30 per cent less than expected for her age Her weight on admission was 17 lbs

On investigation [illegible] showed basically chronic [illegible] Blood urea was 41 mgms

She was treated with streptomycin and nitrofurantoin

An IVP performed on April 5 1965 showed bilateral duplex kidneys with full length double ureters on both sides There was a bladder residue post micturition and reflux was a possibility

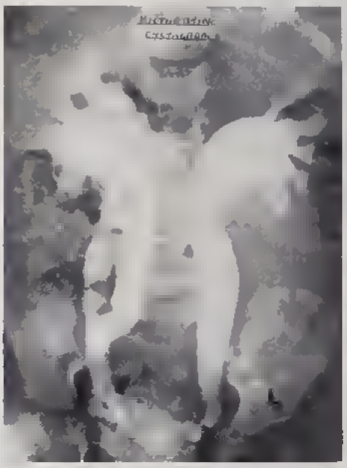


Figure 2 — [illegible] reflux [illegible] double ureters [illegible]

A Micturating Cystogram was carried out (fig. 2). The bladder was filled under screen control and reflux was noted when the bladder was full. Reflux entered both ureters on the right side but only the lower ureter of the left kidney. The ureters formed large saccular reservoirs but were capable of contracting. Vide post micturition film. Reflux occurred each time the patient micturated and a residue could be seen in the bladder and ureters after each act of micturition.

Case 6. A.S. — A 17 year old girl had had recurrent episodes of renal tract infection for two years. Laboratory reports showed streptococcal and E.coli. Her latest episode on April 22, 1966 was responding to antibiotics. An IVP performed on May 11, 1966 (fig. 3) showed the left kidney was smaller than the right and throughout the examination was excreting slightly less than the right. The calyceal pattern was small and irregular confirming the diagnosis of chronic pyelonephritis. Some bladder residue was seen after micturition.

A Micturating Cystogram was carried out on May 13, 1966 (fig. 4). The bladder was filled to capacity and no reflux was seen at rest or straining. On micturition free reflux was shown up the left ureter into the renal pelvis. The degree of emptying of the ureter on subsequent acts of micturition was poor. On the oblique view it could be seen that the ureter was ectopic and entered the urethra at the bladder neck.

This is an example of a rare form of congenital ureteric abnormality with reflux.

Figure 3. Case 6. [illegible] pyelogram [illegible] showing [illegible] left kidney [illegible] [illegible] [illegible].

DISCUSSION

The patient described covers a wide range of the presentation of this condition and of the associated pathological and radiological signs. The recognition of these patients both radiologically and clinically is difficult in the early stages and awareness of the possible presence of reflux is important. A child who presents at birth with a severe congenital deformity such as imperforate anus or meningocoele warrants investigation of the urinary tract. Failure to thrive has been a feature in all of these patients with delay in development. Other illness has tended to mask the severity of the urinary infection. Frequency of micturition

Figure 4 Case 6
7 Micturating cystogram *vesico ureteric reflux into the left ureter which was ectopic entering the bladder neck*

dysuria, urgency and in some cases haematuria may be present. Other signs include vomiting, fever and pain in the loin.

The radiologist should examine the intravenous pyelogram in great detail other wise minimal signs which suggest reflux may be missed. In 30 per cent of cases there may be no signs on the pyelogram (Williams *et al* 1965). An important early sign is the discovery on pyelography of a bladder residue post micturition (Marshall 1962). The bladder itself may be larger than usual often with a double contour or small and contracted with or without increased trabeculation. Bladder neck obstruction is a feature in only 25 per cent of cases (Williams *et al* 1965). In the non obstructed bladder a residue after micturition can be accounted for by drainage of the reflux from the ureters into the bladder (vide case 5).

If reflux is unilateral the degree of concentration on the affected side may be diminished. This effect prior to severe renal damage may be due to dilution caused by reflux from the bladder during the pyelogram. The ureter itself may appear wider throughout the series compared with the normal side (case 2). In more severe unilateral or bilateral disease signs of chronic pyelonephritis can be seen with reduction in renal size, focal scarring of the kidney and calyceal distortion.

(Hodson *et al* 1960 Hutch *et al* 1962). In some patients hydronephrosis is a feature. Anomalies such as duplication or ectopic ureters are easily recognised on pyelography and may be associated with reflux (cases 5 and 6) and signs of associated pyelonephritis should be sought.

Micturating cystography can be performed with simple screening equipment. The bladder is filled to capacity and reflux may be seen at rest in the more severe cases. Micturition will reveal the degree of reflux, usually to the renal pelvis. A surprising dilatation of the ureters may be observed compared with the size seen on the pyelogram (case 5). This reservoir effect is the rationale for teaching the child to triple micturate: each act of micturition clears some more of the ureteric reservoir.

Cases for operation are selected from those who have failed to respond to continuous medical treatment. Many cases of moderate reflux can be kept under control by medical treatment and reflux can be halted (case 3). Others with radiological signs of chronic pyelonephritis, gross anatomical lesions or bladder neck obstruction are best treated surgically. The immediate results of treatment have been very successful, but sufficient time has not elapsed to assess the long term results. One has only to see a patient at the age of sixteen with hypertension and renal failure due to chronic renal damage from reflux which has not been recognised at an early age to be convinced of the serious nature of this disease.

SUMMARY

Six cases of ureteric reflux have been described from the Royal Naval Hospital, Malta, with a review of some of the literature. These have been selected to show examples of the clinical presentation and types of lesion which may be found. The importance of the early recognition of this condition has been stressed, with an indication of some of the features which may be observed.

ACKNOWLEDGMENTS

I wish to thank my colleagues, Surgeon Commander J. R. Kirkpatrick and Surgeon Commander G. J. Milton Thompson, the surgeon and paediatrician in charge of the patients discussed. Also Mr. Innes Williams of Great Ormond Street Hospital, London, who successfully operated on three of the patients.

REFERENCES

De Luca, F. C., Fisher, J. H., and Swenson, O. (1963) *New Engl. J. Med.* **269**, 75.
Edwards, D. (1960) *Modern Trends in Diagnostic Radiology*. Butterworth, London.
Grabb, R. A., Smith, J. H., Flaks, R. H., and Van Epps, E. F. (1964) *Amer. J. Roentgenol.* **92**, No. 2, 255.
Hodson, C. J., and Edwards, D. (1960) *Clin. Radiol.* **11**, 219.
Hutch, J. A., Hinman, F., and Miller, E. R. (1962) *J. Urol.* **88**, 169.
McGovern, J. H., Marshall, V. F., and Paquin, A. J. (1960) *J. Urol.* **83**, 177.
Marshall, F. R. (1962) *J. Urol.* **87**, 68.
Rosenheim, M. L. (1963) *Brit. med. J.* **1**, 1433.
Steele, R. E., Leadbetter, G. W., and Crawford, J. H. (1963) *New Engl. J. Med.* **269**, 883.
Tanagho, E. A., and Hutch, J. A. (1965) *J. Urol.* **93**, 158.
Williams, Innes D., and Eckstein, H. B. (1965) *Brit. J. Urol.* **37**, 13.

PLEURAL MANIFESTATIONS FOLLOWING THE INHALATION OF ASBESTOS IN RELATION TO MALIGNANT CHANGE*

By N. Lloyd Rusby

I propose to restrict my remarks to the pleural manifestations associated with the inhalation of asbestos and their relationship to malignant change. I shall begin by demonstrating the case histories of three patients by way of illustration.

Case 1. Male aged 59. I first saw him in 1960 when he showed all the features of asbestosis and asbestos bodies were found in his sputum. Some years previously he had been exposed to asbestos in the course of his occupation. I saw him again in 1963 when an opacity at the right base was seen on X-ray and this was proved to be a carcinoma. He died in July 1964. I would draw your attention particularly to the thickened, partially calcified pleural plaque on both leaves of the diaphragm (fig. 1); this could be seen very clearly in the lateral tomogram (fig. 2).

Figure 1. Case 1. *Postero-anterior radiograph of right lower lung field showing calcified pleural plaque on diaphragm.*

Figure 2. Case 1. *Lateral tomogram.*

*Paper read at A Symposium held at King Edward VII Hospital, Midhurst, July 4 and 5, 1966 and published in Some Aspects of Carcinoma of the Bronchus and other Malignant Diseases of the Lung. Uxbridge: James Regan & Co. Ltd. p. 73 and reproduced here by kind permission of Beecham Research Laboratories.

Case 2 Male aged 55. This patient was referred by his general practitioner to my Outpatient Clinic at the London Hospital in October 1963 because of an abnormal finding on a routine mass miniature radiograph. He was perfectly well at that time and had been all his life. A mass miniature radiograph taken five years before was presumably considered normal as he had not been recalled for a full-sized film. The P.A. view of the chest (fig. 3) showed areas of irregular calcification on both sides which additional X-rays suggested lay in the pleura. Calcification of this type has been picturesquely described as holly leaf or candle wax calcification. The calcified pleural plaque visible above the left leaf of the diaphragm is of additional interest. In the absence of previous illness and in the face of calcification so widely distributed it was difficult to believe that any of the usual causes such as tuberculosis, empyema or traumatic haemothorax could have been responsible. All investigations proved negative.

Figure 3. Case 2. *Irregular pleural calcification on the left side of the chest. Holly leaf or candle wax type.*

It was not until this same third report appeared in the medical press linking pleural calcification of this type with the inhalation of asbestos (Lawson 1963) I was also struck by the resemblance between the pleural plaque in the X-ray of this patient and the previous one. When questioned more closely he denied any industrial exposure to asbestos but recalled that until twenty-seven years ago he had lived for twenty years in a house adjacent to an asbestos factory. We were able to establish the fact that the prevailing wind blew from the factory towards his garden.

Case 3 Female aged 50. I show this patient through the courtesy of Mr. Vernon Thompson. She was referred to him in 1959 because of a creaking sensation in the right side of her chest noticed particularly after exercise and when lying on the right side. She had lately become a little breathless. On examination

a loud pleural friction rub was heard in the right axilla. X-ray disclosed pleural thickening over the lower portion of the right lung with a more solid area of opacity in the right lower lobe (fig. 4). At operation dense pleural thickening with calcification was found, a partial pleurectomy was done and the right lower lobe which was encased in thickened pleura was freed. There was no evidence of carcinoma.

She has remained well during the past six years and an X-ray taken in 1966 (fig. 5) showed that in the intervening six years she has developed unmistakable "holly leaf" calcification on the left side. She gives no history of contact with asbestos but I suspect there has been exposure of some kind, possibly in a former place of residence.

Figure 4. Case 3. *X-ray in 1958 showing pleural thickening especially*

Figure 5. Case 3. *X-ray in 1966 after a partial pleurectomy five years before. Holly leaf calcification is beginning to develop at the left side.*

Recent studies at the London Hospital and elsewhere have shown, firstly that pleural calcification of this type and particularly calcified hyaline pleural plaques are linked with the presence of asbestos bodies in the lung; secondly that a history of industrial exposure to asbestos is not always obtained but one of residence near an asbestos factory or of contact with relatives working in a factory may be elicited; and thirdly that mesothelioma of the pleura is also closely associated with the presence of asbestos bodies in the lung. I recently had in my care a lady of 71 years of age who died from mesothelioma of the pleura; she had never herself worked in an asbestos factory but twenty-six years ago, over a period of a year or two, she had laundered the clothing of her three daughters who did. This was all the contact she had had.

An important question is does symptomless pleural calcification of this type predispose to the development of mesothelioma? There is evidence that it may do so and I shall illustrate this with a further case

Case 4 Female aged 67 Five years before I saw this patient in 1964 she attended another department of the London Hospital for symptoms unconnected with her chest An X ray of her lungs however taken at that time revealed calcified stuping throughout both lung fields (fig 6) She was referred to me from another hospital on account of a right sided pleural effusion which reaccumulated rapidly after each aspiration An X-ray (fig 7) showed fluid and air in the pleural cavity and quite clearly demonstrated that the calcification lay in the parietal pleura Forty six years before she had worked for two months in an asbestos factory

An open pleural biopsy was done and nitrogen mustard instilled into the pleural cavity The biopsy report showed mesothelioma She remained reasonably well for some months but died in February 1965 from extension of the growth in the pleura and peritoneum A moderate number of asbestos bodies was found in the lung at autopsy

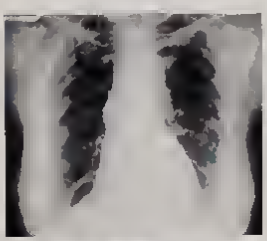


Fig 6 Case 4 X ray in 1959 showing diffuse pleural calcification on both sides

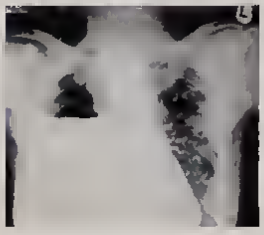


Fig 7 Case 4 X ray in 1964 showing fluid and air between the calcified pleura and the mesothelioma

Such patients do not necessarily develop *pleural* growths, as is exemplified by the following patient

Case 5 Male, aged 54 This man had worked for thirty five years in contact with asbestos applying lagging to pipes In 1962 he became breathless and an X ray (fig 8) showed evidence of bilateral basal pulmonary fibrosis with calcified pleural plaques Asbestos bodies were found in the sputum He died early in 1966 not from pleural mesothelioma but from mesothelioma of the peritoneal cavity

Figure 8 *Case 5 X ray of a male aged 54 who died of peritoneal mesothelioma after thirty-five years exposure to asbestos The lungs show fibrosis*

DISCUSSION

There are several questions which need an answer but I wish to make only one or two observations

Firstly thickening of the pleura with horn-like plaques has for long been a recognised feature of asbestosis (Gloyne 1938) but it is curious that the "holly-leaf" calcification of the costal pleura seems only lately to have been associated with the inhalation of asbestos In spite of working for over thirty years in the East End of London I do not recall seeing anything quite comparable until three years ago, since when I have seen several examples It is possible that the less concentrated exposure encountered from environmental or domestic sources as opposed to that met on the factory floor may determine whether a person gets pleural manifestations rather than the better known pulmonary fibrosis It takes many years for pleural calcification to appear when it does begin to show itself it becomes clearly visible on X ray in five or six years

Secondly the relationship between serosal malignancy and the inhalation of asbestos has also only recently become established A study of this subject has been undertaken at the London Hospital (Hourihane Lessof and Richard

son 1966) and some of the results of this work are shown in the Table. In almost one quarter of routine autopsies when carefully examined asbestos bodies were demonstrated in only 23 out of 25 cases of mesothelioma in the remaining two sections available were less than 30μ in thickness and thus unreliable for this purpose.

TABLE

Asbestos Bodies in Lungs
(The London Hospital)

	Asbestos bodies in lung section 30mu thick	%
Routine autopsies 115	28	24·3
Pleural plaque autopsies 56	56	100
Mesothelioma autopsies 25	23*	92

Only 15 per cent of pleural plaques seen at autopsy were visible on postero anterior chest radiography and these were large and heavily calcified.

*In the remaining two the sections were less than 30mu in thickness.

There would seem to be a gradation of manifestations running parallel with the degree of exposure. It was found that at one end of the scale lay the 25 per cent of apparently normal people. Exposure here was very slight and I suspect that the likelihood of the development of new growth is also very slight. In the 15 per cent of pleural plaques visible on X-ray a history of exposure to asbestos of some sort was obtained in 83 per cent compared with 11 per cent in matched controls, a statistically significant difference. Holly leaf calcification perhaps lies in the same category. The possibility of mesothelioma developing in this group is distinct. At the opposite end of the scale lay those who had suffered a more concentrated exposure in the course of their occupation and who showed the pulmonary fibrosis characteristic of asbestosis. These patients are liable to develop bronchial carcinoma and may do so in too short a time for the pleural changes to appear in a florid form.

Thirdly, when I suggest that pleural calcification of this sort predisposes to serosal malignancy I do not wish to imply that all who show it will inevitably develop mesothelioma, any more than everyone who smokes 25 cigarettes a day for thirty years or more will necessarily develop carcinoma of the bronchus. We do not yet know how many will do so and only the passage of time will supply the answer.

Finally 'holly leaf' calcification of the pleura may account for some at least of the examples of the condition hitherto called 'idiopathic pleural calcification'.

I am indebted to Dr Hourihane, Dr Lessof and Dr Richardson and to the Editor of the British Medical Journal for permission to reproduce Figures 3, 6 and 7

REFERENCES

GLOYNE, S. R. (1938) *In Silicosis and Asbestosis*. Edited by A. J. Lanza. Oxford University Press. London. p. 225.
HOURIHANE, D. O'B., LESSOF, L. and RICHARDSON, P. C. (1966) *Brit. Med. J.* i, 1069.
LAWSON, J. P. (1963) *Clin. Radiol.* **14**, 414.

CLINICAL EXPERIENCE WITH EXTIL

By R. Thomas May, William B. Jack and David R. B. Mends

This paper describes our clinical experience with Extil tablets — each containing the anti histamine carbinoxamine maleate 6 mgm. and pseudo ephedrine 60 mgm — in the treatment of hay fever during the 1967 season

INTRODUCTION

The combination tablet first became available in this country in 1966 Carbinoxamine maleate has been available in USA since the early fifties under the trade name Clistin It is similar in chemical structure to chlorpheniramine maleate (Piriton) Several reports testify to its effectiveness in the treatment of allergic disease (Beale Rawling and Figley 1954 Garat Landa, Richeri and Tracchia 1956 Johnson 1954) Pseudoephedrine is an isomer of ephedrine It is an equally potent bronchodilator and decongestant but less likely to give rise to the side effects associated with ephedrine (Chen 1927 Chen Wu and Henriksen 1929 Dimson 1934 Domonjoz and Fleisch 1939 Tiffeneau and Beauvallet 1945)

The combination tablet has already been the subject of one report in the treatment of hay fever and allergic rhinitis (General Practitioner Research Group 1967) In this controlled study it was shown that the combination was better both clinically and statistically, than either of the single constituents alone Extil has also been found to be significantly more effective than aspirin in relieving symptoms of the common cold (Coates, Hagger Parkin and West 1967)

METHODS

Population Thirty five Royal Marines suffering from hay fever took part in this study Of these 34 were recurrent cases and 1 a fresh case All were warned that drowsiness might occur if alcohol was taken in addition to the treatment

Dosage Schedule An individual bottle containing a week's supply of Extil tablets was dispensed for each case The dose was standardised at one tablet three times daily

Assessment Cases were assessed on a four-point scale at three interviews — initially and at intervals of one week thereafter They were assessed on five symptoms considered characteristic of hay fever — sneezing, running eyes, running nose blocked nose and breathlessness This last symptom was included to assess the degree of bronchospasm so often present in hay fever cases In addition an overall assessment of the severity was made at each interview At the final interview patients were questioned on other points the results of which are also detailed below

RESULTS

The mean scores for each symptom and the overall assessments at the three interviews are shown in Table I

TABLE 1
Index of Severity of Hay Fever Symptoms

Symptom	Interviews		
	1st.	2nd	3rd
Sneezing	1 77	0 60	0 46
Running Eyes	1 74	0 34	0 29
Running Nose	1 60	0 31	0 50
Blocked Nose	0 94	0 83	0 54
Breathlessness	0 43	0 23	0 14
Overall Assessment	1 89	0 67	0 57

The assessment scale was 0 = No symptom
1 = Mild symptom
2 = Moderate symptom
3 = Severe symptom

Patients were asked to say how much relief they had obtained and this was assessed on a four point scale as shown in Table 2

TABLE 2
Patients Opinion of Treatment

Amount of Relief	Number of Patients
None	1
Slight	6
Moderate	10
Complete	18

Patients were also asked to compare Extil therapy with previous treatment for hay fever These results are shown in Table 3

TABLE 3
Comparison with previous Treatment

	Number of Patients
Not applicable	7
Extil worse	2
Extil similar	10
Extil better	16

These figures have been further broken down in Table 4 in respect of the various treatments given.

TABLE 4
Previous Treatment—Number of Patients

Previous Treatment	Comparison of Exhil with Previous Treatment		
	Better	Similar	Worse
Pirnon	8	5	1
Thephorin	2	1	—
Ephedrine Histryl	1	—	—
Antisun Privine	—	1	—
Desensitising Vaccine	—	1	—
Unidentified	5	2	1

Patients were also asked whether they would prefer to take the tablets rather than suffer the symptoms. All patients except one stated this preference. This one case experienced drowsiness and said he would rather put up with the symptoms.

The incidence of side effects is shown in Table 5. In only one case was drowsiness at all severe. Apart from this side effects were mild and wore off after the tablets had been taken for a few days.

TABLE 5
Side Effects

Side Effects	Number of Patients
None	26
Drowsiness	10
Dry mouth	6
Headache	1

DISCUSSION

Hay fever is an annoying but relatively innocuous complaint for which two main lines of treatment are available viz. desensitization or symptomatic treatment with anti-histamine drugs. Desensitization is not without danger and in any case is liable to prove a time-consuming process. The choice of anti-histamines is wide but many of them suffer from the side effect of producing marked drowsiness enough very often to interfere with normal daily routine.

Our experience with Exhil has shown it to be effective in relieving the symptoms of hay fever, particularly sneezing, running eyes and running nose. The

bronchodilator action of pseudo ephedrine also resulted as expected in marked improvement in bronchospasm — the incidence of this symptom was however low in our series

When asked at the end of the trial their opinion of the tablets 51 per cent of cases said they had obtained complete relief of symptoms while they were taking the tablets Another 29 per cent obtained moderate relief Eighty per cent of cases therefore obtained worthwhile relief from their symptoms

Comparison with previous treatments revealed that where applicable Extil was considered superior in 57 per cent similar in 36 per cent and worse in only 7 per cent of cases

As expected the most common side effect was drowsiness and this was reported in 28 per cent of cases This was however of mild intensity in all except one case and rapidly wore off Fifty seven per cent of cases experienced no side effects at all

CONCLUSION

Under the conditions of the trial we found Extil to be an effective therapeutic agent for the symptomatic treatment of hay fever with the minimum occurrence of side effects It has proved useful in treating the bronchospasm so commonly associated with hay fever

REFERENCES

Beale H D, Rawling F F A and Figley K D (1954) *J Allergy* **25** 521
Chen K K (1927) *Arch Intern Med* **39** 404
Chen K K, Wu C K and Henriksen E (1959) *J Pharm Exp* **36** 363
Coates T, Hagger A O Parkin J R and West R (1967) *J Ther Clin Res* **1** 22
Dimson S B (1934) *Quart J Pharm* **7** 73
Dominick R and Fletsch A (1939) *Arch Exp Path Pharm* **192** 645
Garat B R Landa C K Richeri O F R and Tracchia R O (1956) *J Allergy* **27** 57
General Practitioner Research Group (1967) *Practitioner* **198** 713
Johnson H J Jr (1954) *Am Pract and Digest Treat* **5** 862
Tiffeneau R and Beauvallet M (1945) *Comp Rend Soc Biol* **139** 944

Letters to the Editor

Sir

PSYCHIATRIC ALTERNATIVES

A recent article (Wallis 1968) of some polemical interest purports a relationship between *inter alia*, the burning of mentally ill witches in the Middle Ages and the alleged 'rejection' of some of our psychiatric patients in 1964 (Marjot and Warnants 1967)

Unfortunately he appears to have raised false antitheses to confuse the argument He states 'Confronted with a sociopath inadequate person addict, sexual deviant or mild neurotic the Psychiatrist particularly in the Service, faces a dilemma whether to accept or reject the patient Does the choice really lie between acceptance and 'rejection'? — or does the selection of a clinical course of action depend upon proper assessment followed by appropriate advice treatment and a decision whether or not to return the patient to duty? In our experience and we have tried to confirm this by follow up some Service Psychiatrists may be unduly pessimistic about the abilities of patients to adapt to Service life A similar experience is reported in the Annual Report of the Royal Victoria Hospital for 1965 This refers to an increase in the care exercised to arrive at a correct disposal of patients from hospital 'The result is gratifying for many patients who might otherwise have been invalided make a satisfactory return to duty' The report goes on to state that 'many cases could have been dealt with at Unit level without ever entering hospital which event is all too often the sole reason for a man subsequently being stigmatised as "psychiatric" or worse Confidence in the patients ability to adapt themselves to their circumstances cannot lead anyone to suggest that they are rejected!

Wallis makes it clear that he regards the patient rejected if he is sent back to duty but if the Service is regarded as a community the patient is returned to a community of which we are all members The patient furthermore returns under close administrative and medical supervision in his place of duty This is no rejection of the patient unless the Service is regarded as an unpleasant way of life to which the patient is 'forced to return Wallis contradicts himself when he suggests that Edwards and McGhie are followers of the 'notion of acceptance' when they return alcoholics in the Service, while he calls us 'rejectionists' because we advocate retention for a majority of our patients! And of the twenty patients in our series evacuated to the U K in 1964, no fewer than nine (45 %) were suffering from alcoholic states!

Wallis states that he has 'firm knowledge from reliable information and personal experience that many of the eighty five patients returned to duty 'scratched vomited or peptically ulcerated their way home This anecdote causes surprise since the question was specifically asked as part of the follow up procedure about every patient returned to duty and in no case was medical evacuation reported

It is perhaps [illegible] to note that Wallis does not [illegible] to claim that the patients to whom he refers would not have scratched nor vomited nor ulcerated if they had been accepted by granting them the dubious advantage of a psychiatric diagnosis

Another anecdote is the reported conclusion of Rowton Lee that a relationship existed between psychiatric referral and subsequent inefficiency of personnel aboard ship This personal communication was written in 1967 i.e. three years after the alleged events! Of more sinister import is the allegation of precipitate return to the ship with far from full and sympathetic evaluation of the patient and his stressful environment This imputation is also unsubstantiated but appears likely to be based on the accounts of disaffected personnel whose desire to be separated from an unpleasant environment was not satisfied All patients seen by us are always evaluated and treated sympathetically

Wallis goes on to refer to qualitative differences in quantitative terms Thus a psychiatrist cannot completely accept everybody referred to him or adopt a policy of universal permissiveness but total rejection does no good (*sic*) except to ease the burden of the psychiatrist himself The exact meaning of this statement is not as clear as one would wish The author would seem to favour a position intermediate between incomplete acceptance and partial rejection! The part which policy plays in clinical matters is also not made clear Is he alluding to clinically irrelevant factors when reaching decisions?

Writing of adapting individuals to their environment he makes no mention of that class of people who have no wish to adapt to the circumstances in which they find themselves at a particular point in their lives Their adaptive response then consists of behaviour designed to induce others to send them away from where they do not want to remain

One source of confusion may be that Service Psychiatrists are asked to fulfil two functions In one situation they are Specialist Medical Officers who possess, in effect, Executive power to recommend that a person should be invalided from the Service and who can expect this advice to be carried out Their second function is purely advisory wherein they only have the privilege of making recommendations about a man's suitability for Service the nature of his employment man management and Morale generally Willis confuses these two roles when he advocates fitting the diagnosis to the disposal he thinks most appropriate The ethical validity of classifying a man as a Psychiatric casualty because this is the easiest way out is questionable

The points raised by Wallis and by Marjot and Warnants are but part of a wider controversy in medicine, which is based on two equally facitious points of view One is the 'scientific' fallacy which ignores that the patient is a human being responding to the way he is treated and according to his circumstances and with no promise of a solution to his problem

The other fallacy may be called the pastoral error where the doctor is encouraged by himself his profession and outsiders who perhaps should know better to adopt a priestlike role As the doctor is fitted by his training and discipline to treat morbidity he is disposed to approach all human problems as

if he is to be treating disease. Thus he makes use of metaphors such as calling undesirable behaviour of individuals or groups sick behaviour and then attempts to treat the metaphor as if it were literal reality. The view that doctors are subject to pressures from many sides to fulfil people's wishes under the guise of treating an illness has been discussed elsewhere (Plenne 1965). The Annual Report from Netley in 1965 is quite explicit on the same subject. The relevant section reads: 'It has become evident over recent years that psychiatric investigation and treatment is often regarded by executive and regimental medical officers as a convenient way of dealing with welfare or disciplinary problems... an attitude with which the psychiatrist all too often finds it easier to acquiesce when the return to duty of an unwilling soldier is likely to be followed by suicidal threats or gestures, repeated AWOL, complaints from relatives, executive officers, etc.'

We do not believe that mental illness is a myth. On the other hand we do not believe that everybody with personal problems, emotional distress or disturbed behaviour is, *ipso facto*, diseased and a proper person for doctors to treat by medical means. In spite of this we physicians will continue to assist the patient in other ways whenever possible.

Wallis's concluding remarks deserve some support. It may well be that those who are unhappy in the Service but not mentally ill should be assessed by a Group which would include Welfare and Executive Officers. Indeed a Personnel Selection Board could be set up for each Command or Station to ensure the proper assessment and fair disposal to duty or otherwise of those who are unhappy or dissatisfied with the Service. This would be a better method of dealing with such problems than to rely on the 'gamble' of being treated as ill sick and receiving a medical discharge with its attendant stigma.

Signed

David H. Marjot
Surgeon Commander, RN

Louis J. F. Warnants
Lieutenant Colonel, R.A.M.C.

REFERENCES

Annual Report on the Health of the Army. Royal Victoria Hospital, Netley, 1965.
MARJOT, D. H. and WARNANTS, L. J. F. (1967). *J. roy. nav. med. Serv.* **53**, 89.
PLENNE, F. G. (1965). *Int. J. Psycho. Anal.* **46**, 358.
WALLIS, G. G. (1968). *J. roy. nav. med. Serv.* **54**, 80.

(Surgeon Captain Wallis was invited to reply to the above. Editor)

Sir,

I am most grateful for your kind comments (Editorial, 1968) on my note on Psychiatric Participation (Wallis, 1968).

I deeply appreciate also the interest shown by the thoughtfulness and length of the provocative response by Marjot and Warnants (1968) despite their implication that my contribution has no more than some polemical interest, to which, how-

ever, the discourse would reduce itself if I were to make a detailed riposte to their arguments

May I, however, please ask for your indulgence so that I can try to clarify just two points which seem to me to be important

Firstly in both your Editorial and the letter by Marjot and Warnants there is the connotation that in the sense in which I described the terms '*acceptance*' results in invaliding and '*rejection*' in return to duty. Such was far from my intention. At the outset of my paper I said an accepting psychiatrist proceeds on clinical lines whereas a rejector dismisses the person as having a moral or social problem outside the clinical orbit. Either *acceptance* or *rejection* may lead to discharge from the Service but a recommendation for invaliding as part of the clinical process is by no means inevitable.

Secondly Marjot and Warnants say that a patient returned to duty will be under close administrative and medical supervision. But what of the 'rejected' rating in a ship without a medical officer? He is very near the centre of all this controversy.

After their rather grandiose tones Marjot and Warnants ultimately reach a viewpoint approaching yours Sir when you emphasise prevention, and mine. Even though they and I may use different means, let us unite in striving towards the end of fuller and earlier psychiatric participation in promoting the morale of the Services and their dependents.

Signed
Geoffrey Wallis
Surgeon Captain RN

REFERENCES

Editorial (1968) *J roy nav med Serv* **54**: 2.
Marjot D. H. and Warnants L. J. F. (1968) *J roy nav med Serv* **54**: 153.
Wallis G. G. (1968) *J roy nav med Serv* **54**: 80.

THE ROYAL NAVY MEDICAL CLUB DINNER 1968

The annual dinner of the Royal Navy Medical Club was held in the Painted Hall on Friday 5th April, 1968.

The President, Surgeon Vice-Admiral E. D. Caldwell, CB, QHP, MD, ChB, FRCP(Edin), FRCP(Lond) delivered the following speech:

Admiral of the Fleet the Earl Mountbatten of Burma, My Lords, Gentlemen. Nineteen sixty seven will be a difficult year to forget. Some might say the effort would be worth while, but I do not necessarily agree. It is true the Services as a whole — not least the Naval Medical Service — have been under intermittent Government attack, but if one gathers up the fragments of the year and pieces them together into a jigsaw (I use the term intentionally) the resulting pattern is not without its flashes of colour.

The problems which were occupying our minds and of which I spoke at length a year ago are unfortunately still with us and I will not bore you with a long repetition, except to state the obvious — the anxieties and uncertainties of Service doctors and dentists have in no way abated, but I do think that the facts are now widely recognised and I do not think it would be over optimistic to say that as regards doctors and dentists pay in the Services — and I am not referring to the overall Service Pay review — whereas a few months ago we were kicking for touch in our own 25, now we are scrumming down on the Prices and Incomes Board 5 yard line. We shall see.

During all these changes and rumours of changes one endeavours to keep one's ear to the ground, but I think it was Churchill who said — 'keeping one's ear to the ground is an undignified posture to maintain for any length of time'.

Despite the forthcoming cuts it is already a common and all too frequently heard misconception that the Royal Navy has dwindled to a markedly reduced or even insignificant force. It may surprise and enlighten many of you to know that the total number of Officers and Ratings in the Royal Navy in 1900 was approximately 97,000, in 1934 it was 93,000 and to day it is around 96,000. Mind you, despite this, one must face and accept the unpalatable facts of less ships and less foreign postings, and ships and foreign postings still emerge, as marked attractions to young doctors and dentists thinking of a Naval career. What then are we to offer them? Primarily we must maintain and continue to offer them a competent highly skilled medical organisation in which they can take professional pride. Secondly we must and can also attract them with research with submarine medicine, with atomic medicine and with the interesting and expanding physiological problems of the sea and the air. The Naval Medical Service has a good reputation, it offers a good career, let them — and us — all of us — not forget that the sea still covers 75% of the Earth's surface.

For us in the Naval Medical Service the increasing care of dependants in the United Kingdom widens our clinical scope. It is interesting to note that last year our so-called reciprocal agreement with the N.H.S. resulted in over 2,000 more

N.H.S. civilian patients being admitted to Naval hospitals than vice versa — this is good, but we must go further.

It still remains a firm conviction that however difficult it may prove we must persuade the Treasury — for it is they who can stand in the way — to give us full approval for viable and well equipped Maternity Units in Haslar and Plymouth for our own Naval wives but I do repeat the introduction of these midwifery units has got to be pursued, planned and executed most carefully to avoid pitfalls in the early days. Talking of the early days of midwifery may I reminisce for a moment? At Edinburgh where one did one's first midwifery cases as a student under the helpful tough and cynical eye of the Sister in Charge it was in those days the custom as soon as the baby had been delivered for the triumphant student accoucheur to be left to bath the baby over a large bowl on his knees the Sister meanwhile retiring to an adjacent cubicle within easy call in case of difficulty. One such student — so the story goes — in the midst of his task gave an anguished cry for help. Sister" he shouted "The baby has slipped into the water" — "Well" shouted Sister "Pull it out" — "I can't" he said "It's too bloody hot". So much for the pitfalls of midwifery, and now, three final points of policy. First we must go out of our way to understand, to encourage and to instruct the young doctors and dentists who come into the Navy for short commissions to have a look at us and to see the form secondly we must all of us plan for the future and stop clinging to the past and thirdly, as I said last year we must have even closer clinical ties with the Medical Services of the Army and the R.A.F., and with our colleagues in the National Health Service, make no mistake we can all benefit each other.

During the past year two very successful and widely attended Symposia have been held at Haslar one on Chest diseases and the other on Gall Stones organised respectively by the Professor of Medicine, Surgeon Captain Topham and the Professor of Surgery Surgeon Captain Watt. These clinical meetings have now become a regular and valuable means of discussion, and of both learning and teaching current trends and new developments. I know they are very much appreciated in Wessex and also in the Western region both academically and socially.

Another highly appreciated action was the prompt despatch of a team of Naval Doctors and Medical Staff from Bight (under the medical charge of Surgeon Commander Boyle) to the disaster area in Sicily following the recent earthquakes. These disasters and similar occurrences are a sphere in which we are all keen to give our services, wherever and whenever they are required — we are ready and organised to do so at any time.

Later this year Wardmaster Commander Mackenzie will retire and be relieved by Wardmaster Lt. Commander Hamilton. Mackenzie as you may know, was the first ever Wardmaster to wear a brass hat. He joined the Navy as a Probationary Sick Berth Attendant in 1937 and has climaxed his career as a Commander, with both enthusiasm and distinction. Another Special Duties officer in Wardmaster Sub Lieutenant Jewitt distinguished himself by passing out first of all Branches in the Promotion Course, and winning the Sword of Honour for so

doing — a splendid achievement — I am very happy and I am sure you will share this sentiment with me in paying tribute to an invaluable and stannch section of our Naval Medical Service

And now to the pleasant duty of toasting our Guests Although I realise there are many distinguished men both non Medical and Medical including many of our own Consultants dining here to-night I am only able to mention briefly our Official Guests on this occasion

Our Principal Guest is Admiral of the Fleet, Earl Mountbatten of Burma (who has flown from an official visit to Sweden to be with us tonight) His interest in friendliness to, and respect for our Naval doctors are some of the many reasons we wish to pay tribute to him and welcome him amongst us tonight But here I feel it fitting and appropriate too — to re call Countess Edwina Mountbatten of Burma more affectionately known as "Lady Louis" — she had a vital and tireless interest in Naval Medical Welfare this in addition to the heavy duties and journeys she so willingly accepted for the St John's Ambulance Brigade in particular and also her interest in the Royal College of Nursing her warmth and her kindness towards Service patients would even alone, be a fitting Medical Memorial

What *can I* say of Admiral Mountbatten

I think it can well be said that his record of achievement over the last three decades in its scope its variety and its arduous responsibilities *has not* been, and will not be equalled His wartime deeds at sea and particularly his campaign in Burma are in every history book, as are his post-war activities and distinctions but in addition to the subsequently formidable list of widely known tasks and appointments he has undertaken, there may be some who do not know that Admiral Mountbatten is a Fellow of the Royal Society a Colonel of the Life Guards a Freeman of the City of London and of the City of Edinburgh President of the Royal Life Saving Society Governor of the Isle of Wight an Elder Brother of Trinity House President of the Film and Television Arts Commodore of the Sea Scouts President of the Institute of Electronics and finally maybe not inappropriately he is a Member of the *Inner Magic Circle* — I should think so too!

Sir your presence with us tonight is an inspiration and a great pleasure to us all

Officially representing our Civilian Consultants tonight are Dr Donald Brooks Sir Ronald Bodley-Scott and Sir Paul Mallinson to all of whom we are grateful for their clinical opinions their wise counsels and their keen interest in both the Psyche and the Soma of the Royal Naval Medical Service

The Chaplain of the College who said Grace for us this evening is the Reverend Newman but our spiritual welfare is actually tonight in the hands of the Right Reverend Monsignor Pitt, Principal R C Chaplain to the Royal Navy since 1963 and to show we are nothing if not ecumenical we also welcome the Right Reverend Reindorp the Bishop of Guildford, who was an RNVR Chaplain during the War

In addition his face and voice make him well-known on television as indeed is another of our guests, Dr Denis Melrose — notable for his Heart Lung Machine. When he was in the RNVR in Hong Kong with me immediately after the war he was enucleating nauticd tonsils apparently unaware of the fame and achievement that lay ahead of him at Hammersmith.

Air Marshal Sir George Gunn the Director General of Medical Services of the Royal Air Force we welcome and in this the 50th Birthday Year of the RAF we wish him and all his colleagues Congratulations and Many Happy Returns.

From the Army we have Major General John Douglas who most ably represents their Medical Director General. Also with us is Major General Stephens, a most hospitable friend to many of us in his post at Millbank.

The Dental Services of the RAF are represented by Air Vice Marshal Keggin and, still in the Dental world it is a great pleasure to have with us Mr Terence Ward the Dean of the Faculty of Dental Surgery and also a Consulting Oral Surgeon to the Royal Navy. We in the Royal Navy welcome Surgeon Rear Admiral Bill Forrest who has just recently taken up his appointment as Director of the Naval Dental Service. We wish him a successful and happy commission. I would like to extend a warm welcome too to Mr Cooke who is with us tonight as President of the British Medical Association.

Also as Official Guests we have Mr Harold Edwards who as well as his many other Surgical distinctions has been our President of The United Services Section of the Royal Society of Medicine he is most welcome — as too is Sir Geoffrey Todd — a visit to his beautiful hospital at Midhurst in the summer, is one of the pleasant rewards of being MDG.

Many RNR Medical and Dental Officers are present (of whom Surgeon Captain Glover is the senior Serving Officer) and are very warmly welcomed. We are most grateful for the help their doctors and dentists so willingly give us and the more one sees of the RNR, the more one is aware of their enthusiasm and their unselfish, unpublicised and loyal support to the Navy — we are lucky to have them.

Sir James Patterson Ross who is with us tonight must have some nostalgic memories from his days as a Surgeon Sub-Lieutenant in the Navy during the First World War — it is good to see him here.

The President of the Royal Naval College is Admiral Sir Horace Lyddon — to have him here as a Guest in this capacity is to me an added personal pleasure as he has been a very good friend for many years since what might euphemistically be termed our less sedate days — to him and to Captain Hennell we say Thank You for the loan of this magnificent setting for our Dinner — its attractions seem to grow year after year.

Although I said I was only going to mention Official Guests I cannot let the occasion pass without saying how very pleased we all are to see Derek Steele Perkins dining here tonight — I hope he is having a good evening and I am willing to bet him a pound that at this particular moment he is enjoying himself a great deal more than I am!

I would like to thank Surgeon Captain Morgan and Mr Chipman for the hard work of organising this Dinner and it is hard work

Thank you too to the Royal Marine Band which I know is much appreciated

And by no means least our thanks to all the Staff who have given us their time and their efforts

And now to conclude — at last — may I wish all of you Health and Happiness in the year ahead now I ask the Members to rise and drink a Toast to our Guests

Reviews

[illegible] FRACTURES By J Cranford Adams MD MS FRCS Fifth edition Pp viii + 381 Edinburgh and London E & S Livingstone Ltd Price 32s 6d + 4s 6d postage

This book like its companion volume Outline of Orthopaedics is intended primarily for the medical student for the practitioner who seeks a knowledge of general principles rather than of specialised details and for the physiotherapist The call for a fifth edition in just over ten years is evidence enough of the enthusiasm with which it has been received in the past

In this edition the text has been thoroughly revised and a number of new illustrations added The bibliography a useful feature introduced in the previous edition has been enlarged Every Naval medical officer would profit by adding this volume to his bookshelf It is beautifully produced and modestly priced P D G P

FAMILY PLANNING By J E Robinson MB ChB Second edition Pp 72 Edinburgh and London E & S Livingstone Ltd Price 5s + 7d postage

Time was when sex and contraception were not mentioned at all Gradually through the medium of the Mission Hall and later the drawing room sex crept into conversation until we arrived at the latter half of the 20th century when both are taught in schools

This little booklet is a good and honest attempt to find an modern methods of contraception and their reliability having first given a quasi scientific physiological sketch of the workings of the female reproductive tract The author discusses both the physiology and reliability of the safe period a principle relied on by those whose religious persuasions do not allow them to practise contraception and then proceeds to all other forms of contraception both mechanical hormonal and just plain physical giving excellent advice on the method of practice and reliability The book ends on an unpretentious note — as contraception is harmful

For the benefit of Medical Practitioners the appendix details the quite alarming [illegible] list of contraceptive products and the names of their manufacturers together with their local agent

I would recommend this book for all practitioners who are likely to be involved in [illegible] family planning advice but I would more especially suggest to those practitioners who [illegible] us in the patients who consult them to buy one For it would be 5s well spent D C B

THE PHYSIOLOGY OF HUMAN SURVIVAL Edited by O G Edholm and A L Bacharach Pp 381 London Academic Press Price 14ls

This book arose following a symposium held in 1963 on The Biology of Survival which was concerned with the survival of all animals under a variety of environmental conditions The Proceedings of that symposium have already been published (Symposia of the Zoological Society of London No 13 1964) but the papers about man were restricted in abstracts The original material submitted in that symposium is now presented together with additional articles to provide a wider and more detailed account of work on man The emphasis is on the survival of a human individual rather than the human species and the physiological progress of the last few decades is reviewed

The book is well produced and the editors have had the usual struggle to attempt to standardise the units of measurement and spelling of contributors belonging to different disciplines from both sides of the Atlantic While the units remain unavoidably complicated with non-rationalised use of parentheses to give the metric equivalent of the Imperial system (and vice versa) the editors have taken the courageous step of insisting on British spelling throughout which greatly increases the readability of the articles

The first six chapters deal with the effects on man of physical environmental factors such as heat cold high altitude high pressure and changes in gravitational force The second half of the book concerns the limits of alimentary environment brought about by nutrition exercise sleep and sleep-deprivation fatigue emotion and diurnal rhythms Such topics are only infrequently considered in the overall subject of survival and these latter papers contribute much to making this book a valuable work of reference J M Y

DEVELOPMENT OF THE LUNG. Ciba Foundation Symposium. Edited by A. V. S. de Reuck and Ruth Porter. Pp. xi + 408. 134 illustrations. Lund, H. J. & A. Churchill Ltd. Price 65s.

This book contains the proceedings of a Ciba Foundation Symposium held in November 1965 which gathered together twenty-three research workers from different fields — paediatricians, physiologists, physicists, chemists and radiologists.

The main object of the meeting was to discuss pulmonary aspects of human birth with papers on the initiation of respiration and the changes in pulmonary circulation. The subject was approached both from the phylogenetic and ontogenetic directions with reviews of vertebrate evolution from gill to lung breathing and embryology of the human lung. One section of the symposium was devoted to the placenta and the extrapulmonary supply of the foetus and another to the physiological effects of the gas/liquid interface in the lung and the properties of the alveolar lining layer.

The discussions following the formal papers are fully reported and the book strikes with the usual high standard of Ciba productions.

J.M.Y.

A SHORT TEXTBOOK OF ORTHOPAEDICS AND TRAUMATOLOGY. By J. N. Aston. MB, FRCS. Pp. xvi + 307. London: The English Universities Press Ltd. Price 27s. 6d. Paperback and 40s. Library Edition.

This is a sensible paperback in an admirable and very largely successful attempt to compress the whole of orthopaedics and trauma into 300 pages. It is well planned and endowed with a good balance between common conditions and rarities, most of which are at least outlined. The line-drawing illustrations are simple and direct.

There are points in most sections of diagnosis and treatment with which one can disagree, but this is one of the features of the specialty. The general balance is leaning to orthodox methods without dogmatism is excellent.

The main and serious criticism is the apparent lack of proof reading. Spelling and misprinting mirrors abound, the sense of whole sentences is lost (the illustration is upside down and worst of all, some errors in omissions present wrong information. Examples of these misprints are: p. 85 'breathing for swelling'; p. 149 'mobility for inability'; p. 162 'emmarc for convex (in describing scoliosis)'; p. 272 'panic for pain' (Multiple Myeloma — pain is the common presenting symptom).

In its next reprinting when these 100 or so errors are corrected this will be an excellent volume for the undergraduate, and newly qualified doctor interested in orthopaedics. It is a useful revision volume for the general surgeon taking final FRCS though a full-room operation detail would of course be required.

With its low price and size it is worthwhile addition to the field.

P.C.F.

COMPANION TO SURGERY IN AFRICA. Edited by W. W. Davies, MD, FRCS(Eng), FACS. Pp. xxvii + 356. 32 Figures. Edinburgh & London: E. & S. Livingstone Ltd. Price 90s. + 4s. 6d. postage.

This is a book worth waiting for: a fascinating study of diseases unfamiliar to the European surgeon. It is profusely illustrated and beautifully printed and I liked particularly the generous unknowledgements to the many medical and non-medical contributors who receive equal recognition. There is an excellent bibliography with the most important references picked out in heavy type. The style is refreshingly individualistic reflecting the varied personalities of its multiple authorship from the terse tabulated arresting presentation of sickle cell anaemia to the epidemiological survey of goitre, leprosy and oesophageal cancer.

Principles of treatment are clearly defined by surgeons with long experience in Africa and the British surgeon will welcome advice on the management of problems such as tropical ulcers and the treatment of keloid scars. It is not surprising that in the absence of sophisticated radiotherapy the accent is often strongly upon chemotherapy dramatically successful in Burkett's tumour and Kaposi's sarcoma while an ointment method of nitrogen mustard intravenous infusion for head and neck malignancy is described using the Kidde technique to provide abdominal aortic occlusion.

As might be expected the surgery of helminthiasis amoebiasis and tuberculosis figures prominently in this volume but what will impress the British surgeon most is the high incidence of diseases which have long ceased to be a problem in Europe. For instance, methyl strictures and its complications now a minor problem with us dominates the surgery of the genito-urinary system in Africa and carcinoma (cuts is of such importance that it requires a chapter to itself) while the treatment of sigmoid volvulus and of penetrating abdominal injuries from penknives bullets and animal horns provide further absorbing reading.

Professor Davies and his collaborators have done an immense service to surgery in producing this long awaited survey of the surgery of tropical Africa and the publishers are to be congratulated upon producing a first edition worthy of the quality of this work.

J.W.

THE MANAGEMENT AND NURSING OF BURNS Edited by J. Ellsworth Laing MB FRCS and Joyce Harvey SRN SCM Pp 116 London The English Universities Press Ltd Price 10s 6d Paper bound and 17s 6d net Library Edition

This small book has the merit of making its points with commendable clarity and thus succeeds in encompassing the many facets of a complicated problem without confusing the student. It is delightfully illustrated and the drawings of children are particularly appealing. In fact the content and format make this the most attractive and useful book on burns to be published. Modern therapy and techniques are well reviewed and there is welcome emphasis upon prevention of metabolism and diet. However the book is essentially practical and the authors have not hesitated to express their own convictions upon the best methods to follow within their vast experience and acute clinical perception is reflected in the numerous aspects of nursing care which receive their attention. It is therefore a pity that they found themselves unable to resist the temptation common to all writers of books on burns of normalising the raised problem of fluid replacement by several different formulae. With this single exception however this is an outstandingly successful small book which should have a strong appeal to both doctors and nurses and should be applied to all shops and establishments.

J W

ESSENTIALS OF CARDIOLOGY By S G Owen MD FRCP T P Stirling MB MRCP and J Vallance Owen MD FRCP Second edition Pp v + 226 London Lloyd-Luke (Medical Books) Ltd Price 30s

The first edition of this book from Newcastle was received with great enthusiasm in 1961 and strongly recommended to undergraduates post-graduates and specialists in other branches of medicine as a concise orthodox presentation of the essentials of cardiology although it was written primarily for the student.

The passage of time saw the appearance of a Spanish translation in 1967 and now we welcome the second edition. Dr Vallance Owen is now Professor of Medicine at Queen's University Belfast and another Newcastle physician Dr Stirling has become a joint author. The inclusion of the book's name apart from the addition of a chapter on non-ischaemic cardiomyopathy. This has remained accurate communicative and even didactic no references are given and illustrations are confined to diagrams and line sketches. Small is good play a valuable part in pruning an information on medicine cardiology to those who do not specialise in the subject and not only are the authors to be congratulated on their attractive presentation but the publishers have also done well to limit the price to 30s

J M C

DISEASES OF THE EAR By Stanley R Mawson Second Edition Pp xv + 554 Illustrated London Edward Arnold (Publishers) Ltd From £5

The appearance of the second edition of this book only four years after the first edition is a measure of the success and popularity it has achieved.

The text has been thoroughly revised in the light of the changes and advances in otology that have taken place since the publication of the first edition in 1963 to bring it up to date and a number of typographical errors have been corrected.

The same clear method of style of writing has been maintained and the work is extremely readable. The chapter on Operative Surgery is especially worthy of mention and the descriptions supplemented by numerous diagrams make the steps of the various operations clear.

This book must be considered essential reading for every candidate for the DLO or final FRCS and it will surely find a place on the bookshelf of very many consultants.

A valuable text book which can be thoroughly recommended.

G S I

CHEMOTHERAPY By Harris Busch MD PhD and Montagu Lane MS MD Pp 235 Chicago Year Book Medical Publishers Inc Obtainable in UK from John Wiley & Sons Ltd Chichester Price 68s

It is scarcely seems possible that a book on chemotherapy should provide absorbing reading but Professors Busch and Lane have been brilliantly successful in achieving their aim of providing essential information upon developments in a rapidly expanding field which will enable the specialist to make best use of the vast therapeutic resources at his disposal. The book is beautifully produced and well illustrated providing a clear type a mine of information.

The reader is led to an understanding of the chemical formulae by way of the basic natural background to each new therapeutic advance including the nature of the important diseases and an insight into the character of some of the invaders imposing. Nor the less the book is essentially practical and there is full discussion of toxic reactions hidden dangers side-effects combination therapy alternative drugs and the mode of action activity unknown and susceptibility of the various agents. This is particularly well done in the chapter on antibiotics which every clinician would be advised to read if he is to avoid false confidence in so called synergism and the use of drugs which can antagonise one another. He will also

[illegible] the use of highly [illegible] such ineffective antibiotics when his needs can be [illegible] selected drugs of [illegible]th

Those who have been following the recent spectacular advances in cell biology will wish to study what is said of the structure and action of various drugs with the cell — RNA DNA tuberculin nucleic acid ribonucleic acid histamine It is gratifying to learn if the ammonium salt Ammonium D as a general antiviral agent and of the pneumococcus of S hodgkini marginal knipes keratitis and the pneumonia of Isaiah Beta thrombocathaemin in smallpox epidemics

Cancer immunotherapy is well advanced and there is an excellent chapter on the mechanism of action of the antibodies and analogous inhibitors in the treatment of malignant disease explaining the mechanism of resistance. The use of radioactive isotopes and hormones is also well reviewed

There are useful chapters on the chemotherapy of protozoal diseases and antihelminths and antifungal drugs Finally for the surgeon and bacteriologist, a very realistic and informative approach to local anti-infective and surface agents and the rationale which should govern the choice to be made, although the surgeon who follows the regimen advocated for pre-operative sepsis may well require hands of steel Apart from this it is a very helpful and practical book J W

A PRACTICAL GUIDE TO THE CARE OF THE INJURED By P S London MBE, MB BS(Lond) FRCS(Eng) Pp xii + 777 Edinburgh and London E & S Livingstone Ltd Price £7 10s + 4s 6d postage

Mr London has chosen his title well for he draws upon a vast experience at Birmingham Accident Hospital to provide this practical review of the principles techniques hazards and special problems of the surgery of trauma together with its sociological and legal implications

It is a large book because it is comprehensive enough to include those areas of specialised fields which the surgeon who ceases to deal with trauma should know if he is to save life and restore function in mutilated parts As might be expected the author's own interests are reflected in the wide coverage of bone and joint injuries Yet the book is never dull for the forceful style captures something of the urgency of the accident room and while Mr London's dogmatism enough to insist upon the priorities and basic essentials of the initial management of the injured patient has acutely perceptive comments upon new concepts and techniques compiled with an extensive bibliography reveals a breadth of learning and experience which should make this a standard work of reference

Recent research into the nature of the inflammatory response to injury is reflected in the emphasis upon central nervous pressure monitoring although not everyone would regard the use of vasodilators acting through the adrenergic receptors as a safe procedure in the absence of an independent vasopressor drug such as FLV 2 Our own experience of the inaccuracy of blood volume computation by commercial radioisotope methods as compared with alternative radioisotope procedures makes us less enthusiastic about this guide than serial haematocrit readings using the capillary tube technique

Mr London has been lonely in his attempt to inspire collaborators There are excellent sections on antibiotics methods of skin closure the examination and treatment of eye injuries and the disturbed cardiorespiratory physiology seen in chest injuries which is followed by a useful and practical appraisal of artificial ventilation of the lungs a subject usually ill understood by surgeons I did think however that too much importance appeared to be attached to mechanical defibrillation of the heart following cardiac arrest before perhaps other priorities had been satisfied

Mr Walpole Lewin has contributed a timid chapter upon the management of head injuries although some of his views are controversial such as the use of hypothermia in selected cases The dangers of CSF rhinorrhoea and the false confidence engendered by its temporary cessation are rightly emphasised and attention is drawn to the possibility of vertebral basilar artery insufficiently resulting from associated spinal injury

There is a novel introduction to burns injuries by Mr Douglas Jackson who reviews their management at 30 seconds 30 minutes 30 hours 3 weeks and at the first and second 3 months It includes a sensible approach to replacement therapy based upon simple formulae

In the section on anaesthetics there is some useful advice upon the selection of the most suitable drugs for analgesia and emergency anaesthesia although Dr Langrana is rather less enthusiastic about intravenous analgesia than Royal Navy anaesthetists who find it more generally useful for single handed Service situations The use of nerve blocks and the fundamental role of epidural analgesia are discussed

There is a useful chapter on pitfalls occasioned by other factors than the injury itself which while necessarily sketchy is sufficient to alert the clinician to some of the dangers and Mr London reminds a helpful survey of the services provided from Government sources for the care of the disabled There is also an important note button from Wing Com

mandel Wrong Hall in the use of electromyography and finally an excellent summary of the doctor's legal responsibilities supported by illustrative cases

This is an excellent book abundantly illustrated by drawings photographs X rays graphs and diagrams and I liked the tabulated summaries and the numerous and meticulous system of reference It is a book which is long overdue and well worth the money J W

SARCOIDOSIS By J G Scadding MD FRCP(Lond) Pp 526 + index Illustrated, including 16 colour plates London Eyre & Spottiswoode Price £7 7s

This book is a masterpiece written by a world wide authority on the subject of sarcoidosis and providing the first real comprehensive review of this disease process within one single volume Sarcoidosis interests the general physician as the condition can involve almost all the clinical systems of the body and it is now appearing most prevalent (rather than merely being diagnosed more frequently) in the tropics whose tuberculosis has declined to a level offering little incidental stimulation or problems of diagnosis to the chest physician

Professor Scadding's formal treatise of monograph begins with a historical survey and a chapter on the pathology of the condition followed by a systematic assessment of the modes of presentation with further chapters (occupying three fifths of the book) relating to the diseases possible involvement of each clinical system of the body In all there are 27 chapters including ones on immunology aetiology and treatment The author gives a reasonably unnecessarily accepted by all authorities in this country) for stating that the majority of cases of sarcoidosis seen in England are related to M tuberculosis infection but at least he presents all the evidence both for and against this assumption His definition of the process seldom reliable as Sarcoidosis is a disease characterised by the presence in all of several affected organs or tissues of epithelioid cell tubercles without caseation though sometimes numerous minute tubercles may be present at the centres of a few tubercles proceeding either to resolution or to conversion of the epithelioid cell tubercles into avascular swelling hyaline fibrous tissue

The chapter on the lung changes in sarcoidosis deserves special mention as within three and 77 pages including the finest possible collection of chest X ray photographs manifesting all the varied stages of radiological abnormalities distributed in both mass radiography and routine chest and general medical clinical investigation

The final chapter on treatment is rightly short as this author considers that in the great majority of cases of sarcoidosis no therapy is required and in England less than 20 per cent with pulmonary involvement are in this category Certain steroids may be administered to suppress the more granulomatous infiltration when symptoms are distressing or life is endangered but firm indications for this form of treatment including primarily hypercalcaemia calcium changes disfiguring skin lesions bronchial stenosis and encephalopathy

This book is beautifully produced with excellent black and white and coloured photographs and is a great credit to the publishers It is a book unsurpassed and should be available in all medical libraries libraries and chest clinics if not in the personal possession of all general physicians L G T

A SECOND PORTFOLIO OF CHEST RADIOGRAPHS By B T L Ronx ChM FRCSE and T C Dodds FIMLT FIIP FRPS Pp 444 and 339 figures Edinburgh and London E & S Livingstone Ltd Price £5 Postage 4s 6d

It should be emphasised that this is a second portfolio and not a second edition of the first book published four years ago The reviewer had the privilege of reading the initial portfolio and therefore is having the opportunity of assessing the value of its interpretation As the authors state this is a sequel presenting to the undergraduate or postgraduate student a further selection of chest radiographs in book form This is a larger and therefore more expensive volume containing 339 figures each one of which may contain four chest photographs per page The object of the second portfolio must be a little obscure at this stage, but is said to show that there are many exceptions to the rules portrayed in the first book in relation to the interpretation of chest radiographs and the application of these rules to clinical practice

Very few of the original radiological illustrations are repeated in this second volume which certainly contains a wonderful collection of chest radiographs illustrating most thoracic medical and surgical conditions There are 24 chapters incorporating such specific subjects as chest trauma, inhaled foreign bodies staphylococcal pneumonia tuberculosis, aspergillosis haemosiderosis bronchial carcinoma secondary lung tumours, oesophageal abnormalities and almost 100 pages dealing with pulmonary vascular shadows

It would be impossible to introduce a finer series of serial chest radiographs in book form and the authors one of whom is now Professor of Thoracic Surgery in the University of Natal must be complimented on their unique X ray collection of inestimable value in the reference library particularly for the use of post graduate students in radiology chest medicine and surgery more especially in the latter The publishers are also to be congratulated on the standard of the radiological reproductions in photographic form

This can be considered a [illegible] work [illegible] a present standard books of thoracic surgery and respiratory [illegible]

L G T

MODERN TRENDS IN PHARMACOLOGY AND THERAPEUTICS Edited by W F M Fulton BSc MD MRCP Pp x + 372 London Butterworth & Co Ltd Price £4 5s

This is truly an Anglo American contribution so far as form chapters and of the thirteen have been written by numerous specialists in the fields of pharmacology and therapeutics In all there are seventeen contributors to this first Modern Trends edition relevant to these subjects and inevitably the style and presentations vary in accordance with their different interests The American have emphasized the chapters on the uses of the cardiac drugs diuretic agents antirheumatic therapeutics and factors modifying the action of drugs in the body Especially in this foremost chapter is there scope for great discussion and a divergence of views on the use of digitalis and the requirements for propranolol in both myocardial infarction and hypertension Many English cardiologists would not approve of some of the comments passed in this connection

The chapter on the use of oxygen in respiratory failure and circulatory collapse is presented particularly well and that on the current status of hyperbaric oxygen therapy is of extreme interest to Naval Medical Officers emphasises the value in a limited group of cases rather than enumerating the conditions where there has as yet been little evidence of a successful therapeutic effect

In a different sphere the chapters on the chemotherapy of viral and malignant diseases the uses of magnesium and also fibrinolytic agents the control of hyperlipidaemia drugs regulating blood pressure and agents affecting platelet activity all add to the almost stimulating work which has of necessity had to be selective with regard to the rapidly developing subject matter

L G T

SOME RECENT ADVANCES IN INBORN ERRORS OF METABOLISM Edited by K S Holt and V P Coffey Pp viii + 167 Edinburgh and London E & S Livingstone Ltd Price 30s Postage 1s

This small volume contains nineteen papers read at the Fourth Symposium of the Society for the Study of Inborn Errors of Metabolism (SSIEM) held in Dublin in July 1966 Those who recall Parkes Weber's Rare Diseases and Further Rare Diseases published in 1946 and 1949 will appreciate how much has been developed these modern day excursions into the biochemistry and treatment of the exotic errors of metabolism

It is a delight to read these brief authoritative papers which reveal the exciting developments resulting from painstaking observation and research There is something to interest those of many disciplines in the papers on maternal phenylketonuria and foetal brain damage another on the EEG in inborn errors of metabolism others on monosaccharide and disaccharide malabsorption or two intriguing communications on the biochemical and clinical aspects of argininosuccinic

We own much of our progress in the understanding of human metabolism in the study of inborn errors and the publication of the proceedings of this series of symposia has allowed them to reach a far larger audience

J M C

ANATOMY AND SURGERY By Leo M Zimmerman MD and Barry J Anson PhD (Med Sc) Second edition Pp ix + 388 The Williams Wilkins Co Baltimore Obtainable in UK from E & S Livingstone Ltd Edinburgh and London Price £6 18s + 4s 6d postage

This book is the combined work of a surgeon and an anatomist both with a special interest in hernias It is well set out and illustrated with a proper emphasis on inguinal and femoral hernia

The first chapters gives an excellent historical survey and following this the major part of the book deals in great detail with the embryology anatomy and variation in inguinal and femoral hernia Later chapters deal with umbilical ventral diaphragmatic epigastric and peritoneal hernias Various methods of repair are described with greater detail given to the surgical methods employed by Dr Zimmerman

Utility ought to be the principal attribute of every publication states the preface of the first edition of the Encyclopaedia Britannica and this work falls short of this recommendation with regard to the repetition of anatomy in the earlier chapters and with regard to the price These things apart it can be recommended in the general surgeon for the reference library

J B D

YEAR BOOK OF CANCER (1966-1967) Year Book Series Compiled and edited by Randolph Lee Clark SS MD MSc(Surgery) DSc(Hon) and Russel W Cumley RA MA PhD Pp 525 Year Book Medical Publishers Chicago Obtainable in UK from John Wiley & Sons Ltd Chichester Price 98s

Any review of the vast annual literature on cancer is a mammoth task and the editorial team scrutinised no less than ten thousand items to provide a broad spectrum of current re-

search and clinical practice. Selection must have been a difficult problem but the editors have succeeded in providing the busy clinician with an admirable guide to important work which has the additional merit of being well documented while their footnotes often amount to concise discerning commentary upon controversial issues to deter the indiscriminating nihilistic from premature pursuit of the latest trends.

The survey is comprehensive enough to highlight the more active fields of endeavour such as the epidemiology of cancer, genetic factors the influence of emotions and mineral dietary deficiencies and the role of viruses and their detection by immunofluorescent techniques and ferritin coated antibodies. The herpes virus under suspicion from so many directions is now suggested as a factor in Burkitt's tumour and it is interesting to learn that viruses have even been found in germ-free mice obtained by Caesarian section. The behaviour of the transplanted nodes of tumour cells has opened up a new field of fruitful study and work upon the inhibition of DNA and RNA by cytotoxins has been expanded.

Earlier and more accurate diagnosis is being attempted by better radiology the use of isotope scans, etc, the local value of pancreatin anophalins by IV in conjunction with intra arterial hydrogen peroxide lymphangiography and mammography. There is some evidence that bradykinin releasin is responsible for flushing in the carcinoid syndrome.

In chemotherapy, the accent is upon combined alkylating agents — anti-metabolite therapy. Pre operative radiotherapy and radical surgery have improved the prognosis in fibrosarcoma where a five year cure rate of 50 per cent is being achieved. Laser beams have proved disappointing to control and have not fulfilled their earlier promise. However an important development in radiotherapy is the discovery that high linear energy transfer by fast neutron beams may be more effective for the anoxic centres of tumours than conventional radiotherapy with hyperbaric oxygenation. On the whole however the trend in therapy today is upon an endeavour to reduce the patient's own resistance rather than the destruction of every malignant cell. The occasional spontaneous regression lends support to this outlook but in the case of malignant melanoma this welcome development has been found intrahuman to metastatic deposits in the parotid gland. However hormonal therapy receives less attention in this volume than perhaps it deserves. Finally while cancer of the lung in women continues to increase there is some evidence to suggest that the beginning of the end of the continuing rise of pulmonary cancer is now in sight.

J W

A Traveller's Guide to Health. By Lieutenant Colonel James M Adam, RAMC. Pp 189 + 12 figures. London: Sphere Books Ltd. Price 5s.

The author and the Royal Geographical Society are to be complimented on producing a book which must eventually become a *vade mecum* for travellers equally at home in brief case holdall or first aid pack and ideal in size and neat for any pocket.

Composed of five chapters two appendices and an efficient reference index containing over 500 items the Guide deals in a comprehensive and practical fashion with all common emergencies liable to be encountered throughout the world. The chapters on Diseases pending in the Tropics and Medical Problems in Cold Regions are particularly well written containing much useful information in readily set out.

Although primarily written for the layman with no medical knowledge this handbook would be of undoubted value in those involved in EXPED training schemes.

J D S

Medical Aspects of Sport and Physical Fitness. By J G P Williams, MB, BChir, FRCS(Edin). Pp 633. Oxford: Pergamon Press Ltd. Price 15s.

It is a common misconception of the medical profession that a sportsman does not receive the attention he needs to fulfil the obvious aim that the patient should be treated so that he can return to his pre-injury state or as near it as possible. Masterly inactivity and placebo and plaster or strapping are the mainstays of the therapeutic regime. This volume has the aim of many of the station book stall paperbacks but nonsense as an explanation of the physiology, the myths and the psychology of the individual who prefers active recreation that is usually found in heavy textbooks.

The purpose of the author is to clarify the various mysteries of an active pursuit for the trainers and coaches rather than to detail diagnosis and treatment for doctors. This he does well and any doctor who has sportsmen under his care should have the information available in this booklet before he can do this well. At 15s it might seem expensive but it is a cheap price to pay to avoid being regarded as one of those doctors whose patients nonsense in waste of time to see him because he'll only tell me to rest it for a week.

D F M

The Principles of Radiation Protection. Edited by K Z Morgan and J F Turner. Pp xix + 622. New York, London and Sydney: John Wiley & Sons Inc. Price £6 5s.

This book is to some extent a memorial to Elda Anderson as well as a monument in the teaching of one of the founding fathers of health physics — Dr Karl Z Morgan. Although substantial in textbook of health physics this in however one thing it is not. It is in fact an excellent postgraduate manual on subjects of radiation physics and dosimetry.

The numerous contributors have made a highly commendable effort within their fields, but to have been a textbook of health physics the editors should of necessity have included articles on the principles of waste disposal, nuclear medicine and other associated subjects.

Of necessity there are errors in such a comprehensive book part due to mistakes made in the presentation of material and part due to the length of time it has been in preparation. In the first instance figure 6.5 does not represent the reference made to it in the text. Anachronistic errors occur in the use for instance of n for nuric rather than Cu. There are few references to radiobiological work carried out in the last five years and only 24 lines on thermoluminescent dosimetry.

ICRP is misquoted in the reference to the recommended quarterly dose limit which now stands at half the annual limit and to the allowed dose for planned special exposures which stands at twice the annual limit when the justification can be shown to exist.

In spite of these relatively minor shortcomings and in spite of its leaning to US practice in instrumentation and legal control this is an excellent book. Its wealth of references (except where already mentioned) and its content of over 250 problems for use in illustrating the various chapters make it a valuable aid for postgraduate teaching.

C O H

News of the Service

OBITUARIES

Surgeon Vice-Admiral Sir Henry St Clair COLSON died on February 27 1968 at the age of 80.

Born on July 29 1887 Henry St Clair Colson was educated at the King Edward VI Grammar School Southampton and at Westminster Hospital where he qualified LMSSA in 1912. He joined the Royal Naval Medical Service in October 1912 as an acting surgeon. The following year he graduated MB BS. From August 1913 until August 1916 he served in HMS *Swiftsure* in North America and the West Indies and then had over two years' service with the Royal Marines. He took part in the Zeebrugge Mole attack on April 23 1918 and received high praise from the Vice-Admiral (Dover) for his striking work with the 4th RN Battalion and in HMS *Undaunted* that day. For his great devotion to duty on this occasion he was specially promoted to Surgeon Lieutenant-Commander with effect from April 23 1916.

In June 1921 he was appointed to the Royal Naval Hospital Bermuda as specialist in bacteriology for a period of three years during which time he was promoted to Surgeon Commander. After service in South Africa he joined the Royal Naval Hospital Chatham in 1927 and served 2½ years there specialising in bacteriology and pathology. In 1928 he took the DPH. His appointments from 1930 to 1932 included nine months in the *Revenge* and *Resolution* as senior medical officer of the 1st Battle Squadron and in August 1932 he became Naval Health Officer of the Portsmouth Command. He was promoted to Surgeon Captain on December 31 1934 and in May 1935 he joined HMS *St Angelo* to undertake the corresponding post in the Mediterranean Station for three years. He served again as Naval Health Officer in the Portsmouth Command from 1939 until he was transferred to the Royal Naval Auxiliary Hospital Shaftesbury in 1941. In 1942 he was appointed *CBE* and in September of that year was promoted to Surgeon Rear-Admiral to take charge of the large Royal Naval Auxiliary Hospital at Barrow Gurney near Bristol.

In January 1946 Sir Henry succeeded Surgeon Vice-Admiral Sir Sheldon Dudley as Medical Director-General of the Navy. In the same year he became an honorary physician to King George VI was appointed *CB* and became a Knight of Grace of the Order of St John of Jerusalem. In 1947 he was elected a Fellow of the Royal College of Physicians and was appointed KCB.

He was placed on the retired list on January 1 1949 after a distinguished career of over 36 years marked by his tireless enthusiasm for the Royal Naval Medical Service.

Sir Henry was an excellent leader quick to make decisions and decisive in carrying them out and he deservedly won a wide reputation for his outstanding organisational ability. Those who were fortunate enough to know him well remember with affection a pleasant and unassuming but strong personality and will wish to extend their sympathy to Lady Colson and their son.

N S H

Surgeon Commander (D) Penry Glaskin RICHARDS LDS RCS (Retd) died on February 22 1968 at the age of 79.

He entered the Royal Navy as a Surgeon Lieutenant (D) on August 5 1914 being promoted to Surgeon Lieutenant-Commander (D) on August 5 1920 and to Surgeon Commander (D) on retirement on December 8 1933. He was recalled to service in 1939 and remained on the Retired List on July 30 1945.

HONOURS AND AWARDS

QUEEN'S HONORARY DENTAL SURGEON

Surgeon Captain (D) D L Chodridge HDD LDS (29 2 68)

QUEEN'S BIRTHDAY HONOURS — 1968

Companion of the Most Honourable Order of the Bath

Surgeon Rear-Admiral S M Ide *QHP* MD ChB MSc DTM & H

Officer of the Most Excellent Order of the British Empire

Surgeon Commander J S Ritchie MB ChB DLO

HIGHER QUALIFICATIONS

Surgeon Vice-Admiral E D Caldwell—FRCP (Lond)
Surgeon Commander P W Head—FRCS (Eng) (FNE)

Surgeon Lieutenant Commander R C Telfer—FRCS (Edin)
Surgeon Lieutenant-Commander A J Kimioull—FRCS (Eng) (Oph)
Surgeon Lieutenant Commander P D Jackson—DLO and FRCS (Eng) (ENT)
Surgeon Lieutenant-Commander R Radford—FFARCS (Eng)
Surgeon Lieutenant-Commander C W Chapmann—FRCS(Eng)
Surgeon Lieutenant Commander R J Cole—FFARCS(Ireland)
Surgeon Lieutenant Commander (D) S N Russell—FDS RCS
Surgeon Lieutenant J R Russell—DObstRCOG

PROMOTIONS

To Surgeon Lieutenant-Commander D C Whyte MB BS J B O'Meara MB BS M J B Nicholson MB BS MRCS LRCP
To Surgeon Lieutenant-Commander (D) J C Ferrer BDS P K G Fradgeley BDS LDS RCS
To Surgeon Lieutenant C M Lee MB BS MRCS LRCP R H Hunt MB ChB C M Randall MB BS D A Martin MB ChB M J L Hopkins MB BCh MRCS LCRP M B Ransom MB ChB J R C Sharp MB BS MRCS LRCP A J R Macdonald MB BS C I Dorrs MB ChB A H Osborne MRCS LRCP D S Robins MRCS LRCP A J M Proctor MRCS LRCP R G Fitzgerald MB BCh BAO I M M Walsh MB BS MRCS LRCP J F Gordon MA MB BCh C G Church MRCS LRCP
To Surgeon Lieutenant (D) N Harkness BChD

TRANSFERRED TO PERMANENT LIST

Surgeon Lieutenant-Commander W R Fison MA BM BCh DObstRCOG DIH R J Vaughan MB BCh

NEW ENTRIES

Surgeon Sub Lieutenant R J Brooke C Crooks E H M B Doyle W R B John F Jones O Soul
Surgeon Sub Lieutenant (D) R A Pratt

RETIREMENTS

Surgeon Captain R M Latta QHS MB CIB R T Mny MRCS LRCP B Ridgway MB ChB DMRD
Surgeon Commander F R Aston MRCS LRCP

TERMINATION OF COMMISSIONS AND RELEASES

Surgeon Commander A H Torley MB BS FRCS
Surgeon Lieutenant Commander (D) C E M rris BDS LDS
Surgeon Lieutenant-Commander (D) D R James BDS FDS RCS
Surgeon Lieutenant C J Moore MB BS DObstRCOG
Surgeon Lieutenant (D) J L Bradbeer BDS LDS J N Cran BChD LDS

WARDMASTERS

QUEEN'S BIRTHDAY HONOURS 1968

Members of the Order of the British Empire

Wardmaster Lieutenant-Commander O A Saunders

Promotions

To Wardmaster Commander G C Hamilton
To Wardmaster Lieutenant N Carter M Harper
To Acting Wardmaster Sub Lieutenant H R Hussey R W Jewell

Retirements

Wardmaster Lieutenant Commander P McGreen

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

QUEEN'S BIRTHDAY HONOURS 1968

Commanders of the Order of the British Empire

Miss M S Fetherstone-Dilke RRC QHNS (Matron-in-Chief)

To be Ordinary Associates of the Royal Red Cross (Second Class)

Miss V Davidson Superintending Sister and Miss H E Rollo Head Naval Nurse

New Entries

Nursing Sister R Allish J C Atkinson M E Cook J E Crowther J Dainith V M Evans H E J Gillespie J Lawrence A Richards S Waldingham

ROYAL NAVAL RESERVE

Queen's Honorary Dental Surgeon

Surgeon Captain (D) Morris Bennett *VRD* BA LDS

Promotions

To Surgeon Lieutenant-Commander J T Cooke, MB BS
To Surgeon Lieutenant-Commander (D) A D Ritchie LDS RCS

Retirements

Surgeon Commander K R Wilson *VRD* MRCS LRCP
Surgeon Lieutenant Commander J S Hales MB BS P A T Phibbs *VRD* BA MB BCh MRCS LRCP I A Hunter MB BS DObstRCOG

CIVILIAN APPOINTMENTS OF RETIRED ROYAL NAVAL MEDICAL OFFICERS

Surgeon Captain H L Cleave OBE Devonport Dockyard 3 4 68
Surgeon Captain R M Latta HMS Osprey 3 5 68

OMISSION

It is regretted that the following reference was omitted from A Note on Foot and Mouth Disease (*J roy nav Serv* **54** 83)
MARTIN C R A (1950) Practical Food Inspection Vol I p 196 H K Lewis & Co., Ltd

Notice

THE EDITOR invites medical officers to send in original papers on professional subjects travel personal experiences, etc. Items of news and matters of interest to the naval medical service will be welcomed from ships and establishments on home and foreign station Notices of births, marriages and deaths are inserted free of charge to subscribers

All articles or communications published in the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE will become the property of the JOURNAL with full copyright powers unless the author declares when sending in the article that he desires to reserve the copyright to himself

The Harvard system should be employed for bibliographical references these references being arranged in alphabetical order of the author's name at the end of the contribution, thus 'SMITH, F G (1935) *J roy nav med Serv* **22** 53' In the text a reference to a publication should be cited by giving the author and in brackets the date thus 'Smith (1935) believed this to be due, etc .' or ' lack of basic information on the strategic fundamentals of the science of the sea (Carlson 1956)'

The JOURNAL is published 3 times a year, 3 numbers comprising one volume

Articles and communications may be sent to the Editor at any time **They should be clearly written or, preferably, typed and sent in triplicate** to the Editor RN Hospital Haslar, Gosport Hants

Subscriptions

For RN and RNR medical and dental personnel on the active or retired list, and for Consultants to the Royal Navy the subscription is 20s per annum (postage included) payable on 1st January of each year Single copies 7s

For all others who are *not* to the above categories the subscription is 24s per annum (postage included) or 8s per single copy

Cheques and postal orders should be crossed Lloyds Bank Ltd and made payable to the Editor The Journal of the RN Medical Service

The payment of subscriptions by banker's order is recommended as it relieves the subscriber of the necessity of forwarding a cheque each year and simplifies the keeping of accounts.

All applications for Advertisements to be made to

THE EDITOR
JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE
RN HOSPITAL HASLAR GOSPORT HANTS

No. 3 Winter 1968 Vol LIV

Journal
of the
Royal Naval Medical Service

PUBLISHED THREE TIMES A YEAR

(The Ministry of Defence (N) does not accept responsibility for the opinions expressed in this Journal)

Editorial

CONGRATULATIONS

First and foremost, sincere congratulations and best wishes to Surgeon Rear-Admiral E B Bradbury CB QHP on his appointment as the next Medical Director-General (Naval)

As we go to press we are not yet certain whether he will be supported by three or only two Surgeon Rear-Admirals For the sake of the Branch we trust it will be the former

SYMPOSIA

In the autumn of next year there is to be a further Symposium of Naval Medicine to be held in London on the lines of the previous one in 1965 Although it is almost 12 months ahead planning must start at once The aim will be to present to our medical colleagues and students just what Naval Medicine has accomplished what it has to offer and what it can look forward to in the future

Dates and details are not yet available When they are they will be promulgated but meanwhile will the clinicians the boffins and the salt horses please consider possible contributions and ideas for papers discussions or exhibitions This will be your Symposium

Recent Clinical Symposia have produced excellent papers and discussions It is hoped to include selected papers and extracts in the Journal as far as resources permit. We must, however ensure a balanced presentation One of the major difficulties is that of translating the spoken word from tape to text. So few speakers today are prepared to produce a paper for publication and yet give their address in an informal and intimate manner

However many of our medical officers are compelled to serve in isolated situations and no doubt appreciate being kept informed of the latest trends in clinical subjects from the experts many of whom are our own Civilian Naval Consultants

It is hoped that the next two numbers of the Journal will include selected papers from the Symposia on Modern Trends in Nervous Diseases and Gastro-Intestinal Disorders held recently in the Royal Naval Hospital Haslar

Symposium on Cholelithiasis

A Symposium on Cholelithiasis was held at the Royal Naval Hospital, Haslar, on February 9, 1968 and it gives us great pleasure to reproduce extracts from some of the comments prepared from our tape recording of the proceedings

Participants

Surgeon Vice-Admiral E D Caldwell C B Q H P M D Ch B F R C P (Edin & Lond), The Medical Director-General (Naval)

Mr R H Franklin F R C S, Senior Lecturer and Surgeon Postgraduate Medical School, London

Dr F Avery Jones, C B E., M D F R C P Physician Central Middlesex Hospital, Gastroenterologist, St. Mark's Hospital, London

Professor L P Le Quesne M.A D M M Ch F R C S Professor of Surgery Middlesex Hospital London

Professor A J Harding Rains M S., F R C S., Professor of Surgery, Charing Cross Hospital London

Dr C. G Whiteside. F F R D M R D., Radiologist, Middlesex Hospital, London.

Surgeon Rear Admiral E B Bradbury, C B, Q H P., Medical Officer in Charge, Royal Naval Hospital Haslar, welcomed the participants and introduced the Medical Director General (Naval) and Speakers

INTRODUCTION

Surgeon Vice Admiral E D Caldwell One night just after qualifying I was the duty doctor in a general practice when the bell rang and a girl asked me to come immediately to her mother who was in great pain When we got to within 100 yards of the house, I could hear adult screams which in no way made me any happier, but fortunately the relatives were able to tell me that the mother was having a gall-stone attack for which the doctor usually gave her an injection This helped me enormously! I tell you this because two things emerged and were stamped indelibly upon my memory one was the agony of biliary colic and the other the plateau pattern of the pain as opposed to a cycle of pain Professor Harding Rains has said recently that the old axiom that a typical gall-stone sufferer is a fair, fat fertile female in the forties is rather tending to lose its pertinence We shall probably learn more about this later but it does interest me that we are in a Naval Hospital discussing gall stones

THE AETIOLOGY OF CHOLELITHIASIS

By Professor A. J. Harding Rains

About 6 per cent. of gall-stones appear to consist of pure cholesterol 10 to 15 per cent. of pure pigment and the rest are mixtures. In addition to cholesterol and pigment mixed stones may contain calcium carbonate calcium phosphate and some protein and it is probable that these substances play an equally important part in the growth of stones. The time honoured aetiological classification of gall stones groups them under metabolic causes infection and stasis and I should like to consider these headings in rather a new light and talk about them in a roundabout way.

Diet

First there is the question of diet and its effect upon the formation of gall-stones. One of the most intriguing things that has been discovered in the last 10 or 20 years is the high proportion of pigment stones in the common bile duct to be found in the Japanese and the Koreans. Agricultural workers and farm workers in fact, get pigment stones but professors doctors and clerical workers get mixed stones of cholesterol and bile pigment. This curious change which occurs with improvement in status can be compared with the changing incidence of bladder stones. When data on bladder stones were first collected at the Norfolk and Norwich Hospital around 1780 all the bladder stones were discovered in young children but now things have changed. Children with bladder stones are no longer seen only a few old men. There is pretty well only one place in the world where bladder stones in children are still to be found and that is in north-eastern Thailand, which has a sort of 'stone belt' with the stones occuring predominently in young boys. As one moves into the western areas of the world one finds that urinary tract stones are renal stones. Changes in composition and distribution of gall stones makes one think that there must also be some dietary factors. In Columbia for instance it is the poorer classes who tend to get gall-stones and it is interesting to find that their diet is very low in protein and vitamins and very high in sucrose because they consume a high proportion of cane sugar which is about the only foodstuff that is readily available.

The golden hamster is one of the experimental animals in which gall stones seem to be formed very frequently and if hamsters are fed on a diet deficient in protein and vitamins and high in sucrose stones are formed. Copenhagen workers have shown that calculus formation can be stopped by adding various oils yeast and even copper sulphate to the diet. In addition a Japanese once produced gall-stones by feeding animals on a diet deficient in vitamin A. Naturally all this stimulates research into what might be the chemical mechanism of stone formation.

Cholesterol and bile salts

Cholesterol is broken down in the liver to form related bile salts which are responsible for helping the cholesterol to come into solution as otherwise it is a completely insoluble substance. How do they do it? Well one of the interesting things is that the formula of sodium cholate is very similar to that of long chain

paraffin salt detergents which are amphipathic [illegible] is hydrophilic and the other is hydrophobic it behaves [illegible] that at a certain critical concentration of a solution the physical characteristics begin to change and the molecules either group themselves into [illegible] kind of spherical shape or assume a laminated appearance This grouping is called a micelle The hydrophobic parts turn themselves inwards and the hydrophilic parts outwards Micelles of detergents begin to form at a quite low critical concentration so that it is not necessary to use much detergent in washing up water to be effective This phenomenon also applies to bile and at a low concentration bile salts undergo micelle formation which enables them to dissolve anything which is insoluble in water and this is how the cholesterol is actually carried in solution It is possible to determine the cholesterol-dissolving power of any bile salt at any concentration and temperature However if you try such experiments at 18 C nothing happens Commercial interests are well aware of the need to provide the correct water temperature in order to obtain the best results for certain types of washing using a particular detergent and this is also true of body detergents the bile salts which work best at 37 C and at this temperature readily take up cholesterol in solution One also finds that there is a critical ratio between cholesterol and bile acids of about 1 12 and if a situation develops in which excess cholesterol is being offered to the bile or the liver is not producing a sufficient quantity or quality of bile salts then the cholesterol is likely to come out of solution in crystal form

Hypercholesteraemia It was always thought that the hypercholesteraemia that occurs say in pregnancy was one of the causes of gall-stones High serum cholesterol levels do occur but in fact Mr Patey of the Middlesex Hospital many years ago showed that it is almost impossible experimentally to get an excess of cholesterol in the bile except by stuffing it into experimental animals by every conceivable route and then cholesterol is deposited only if an operation is performed and the gall bladder is damaged This work together with our knowledge of groups of people with very high serum cholesterol levels who are not specially prone to develop gall stones makes one feel that hypercholesteraemia as such is not a cause of gall stone formation Increased concentration of cholesterol may occur in the gall-bladder if there is much exfoliation of cells of the mucous membrane as can happen in inflammation

Bile salt reduction Cholesterol can equally well come out of solution in any circumstances in which the bile salt content of bile is decreased for example by a high sucrose and carbohydrate diet which may upset the critical ratio Again bile salts tend to be selectively re absorbed through the wall of an inflamed gall bladder and this also may lead to reduction in bile salts Of course this does not necessarily imply stone formation The other factor in inflammation that upsets cholesterol solubility is pH for the bile has a certain amount of buffering power and an obstructed cystic duct may result in a fall in pH which will allow cholesterol to be precipitated

Bile Pigments We haven't much time to talk about how bile pigments are held in solution but we know that bilirubin which is normally insoluble in water is

conjugated with glucuronic acid to form the soluble compound. Much more experimental work requires to be done for we should like to know the actual physical method whereby bilirubin is carried in solution as the glucuronide but bilirubin has proved to be a difficult substance to work with. Liver damage from any cause — obstruction infection or toxins — or overloading of the liver with pigment as the result of malaria or bleeding diseases may permit insoluble pigment to appear in the bile.

'Seeds' for crystal and stone growth

Now it must be obvious that in any system where the concentration of a substance becomes critical almost anything will act as a nucleus to stone formation. There are all kinds of crystal seeds and one of the earliest found were epithelial cells and biliary casts. Rovsing the famous Danish Professor stated in 1928 that all gall-stones were formed on a seed of insoluble bile pigment and that cholesterol crystals were then formed around it. Any foreign body can cause stone formation, particularly in the common bile duct. The Japanese and the Koreans I mentioned often suffer from parasitic infections and ova of the ascaris are often at the centre of stones which are most commonly found in the common bile duct. Rolled up plum and tomato skins may also enter the common bile duct to form a stone and I have had stones with sutures as their nuclei. Bacteria may also act as 'seeds'. *Salmonella typhi*. *Escherichia coli* streptococci, staphylococci and even actinomyces have been found in stones. As you are a Naval audience you may remember that while it was Lord Moynihan who said that a gall stone is a 'tombstone erected to the memory of the organism within it' he probably got the idea from the Frenchman DuBois who remarked that 'the pearl is the brilliant sarcophagus of a worm'. Indeed, in 1930 Sir John Bland Sutton used such an illustration in his book 'On Faith and Science in Surgery'.

Stasis

Another aspect of stone formation which is worth examining is that of stasis. Nobody completely empties his gall-bladder there is always some residual bile, and the bile coming from the liver after the gall-bladder has emptied enters the gall-bladder and is mixed with some of the concentrated bile that has been left behind. But certainly during the last 3 months of pregnancy and possibly in other conditions some of the concentrated bile fails to mix with the fresh incoming bile and a layering effect occurs with biles of different concentration pH and specific gravity so that an interface develops between the two. It has been shown that cholesterol and bile salts diffuse at different rates across the interface with disturbance of the bile salt/cholesterol ratio and precipitation of cholesterol crystals which in turn may act as 'seeds' for stone formation.

Microliths. Microliths are tiny amorphous granules which form in the presence of protein grow into larger spheres and coalesce to produce the mulberry type of calculus. They begin as amorphous paracrystalline bodies but as they begin to come together they undergoe change within and then present a pure crystalline appearance. This happens with both calcium carbonate and cholesterol and may

explain how lobsters, crabs and limpets form their shells Although these calculi have the appearance of little balls stuck together in 'mulberry' form, they have a radiating crystalline structure on cross-section which is rather beautiful Sometimes, however, if the solution is aqueous rather than colloidal, the stones look rather like a ball of wool This is the 'myelin' form of cholesterol with criss-crossing fibres

Crystal growth in mixed stones Recently, a perfectly hexagonal gall stone was analysed by Dame Katherine Lonsdale's team of crystallographers at University College It was found in a cream of calcium carbonate within an empyema of the gall bladder They discovered that it consisted of three different types of calcium carbonate — vaterite aragonite and calcite — and nothing else Dame Katherine Lonsdale suggests that one of the reasons why stones, including mixed stones grow is because their crystals have the same kind of mathematical lattice the faces of the crystals fitting together Certainly the crystal lattice of cholesterol is mathematically similar to the crystal lattice of various calcium carbonates, but that of the bile pigments has yet to be studied We are going to hear much more about stone growth, in the future from the crystallographers

DISCUSSION

Professor Le Quesne Thank you very much Professor Rams We have a few minutes for question and discussion

Mr Robert Campbell Is it still true that in cholesterolosis or 'strawberry' gall bladder, polypoid cholesterol deposits fall off and form the nidus for a stone?

Professor Rams Yes, it is so In this curious type of chronic cholecystitis the mucous membrane is quite red and little yellow pips of cholesterol form in the actual wall of the gall bladder This was always thought to be a metabolic problem but it is now considered that it is a type of inflammation It is perfectly true that little polypoid growths may act as seeds and crystals form around them

Professor Le Quesne I thought your observations about layering in the gall bladder were interesting because it correlates with a subject in which Dr Whiteside and I have been interested for a number of years I refer to those interesting gall-bladders that have transverse strictures It is very common to get stones distal to the stricture and equally common on cholecystography to see different concentrations of dye in the two loculi and this presumably is an expression of this layering phenomenon you were talking about

Professor Rams Yes this would be so Layering of bile is a phenomenon which requires much closer attention The first experimental work was done in Sweden and I think, Canada

Professor Watt I was very interested to hear what Professor Rams said about the role of exfoliation How much is this due to the protein that gets added to the bile and how much is it due to blocking of the cystic duct as the result of exfoliation and consequent deprivation of the gall-bladder of the bile acids? This is the first question and the second question is this is there any relationship between the for-

mation of gall stones in the main bile ducts and cholestasis which seems to be a condition initiated by so many different factors — viral infective chemical, drugs hormonal and so on?

Professor Rains The original theory was that all gall-stones were formed as a result of exfoliation *and* a proteinous exudate caused by inflammation and it may well be that, in many cases, the gall-stone begins because of seeding by exfoliated cells in such a milieu It is not the only cause and I have shown you that we have begun to realise that a seed can be started in all kinds of ways I have only once, and curiously enough this week, seen a cystic duct blocked by what appeared to be a mass of exfoliated stuff — there were no stones there — and I have never seen this before It is to be remembered that exfoliation occurs in the small intestine the whole time so it also must occur normally as well as pathologically in the gall-bladder As for cholestasis this is very likely Besides virus damage to the liver there's alcohol carbon monoxide car fumes to mention only a few and I think the next few years are going to reveal some interesting work on the various 'poisons that are being fed to the liver continually to determine their effect upon the bile salts output cholesterol and bilirubin We do not know the answer yet. Certainly we are assailed by all kinds of poisons besides the sucrose in liquorice allsorts!

Mr Bernard Williams Have you found any increase in gall-stones in people who have had a vagotomy?

Professor Rains No I haven't experience of enough cases to allow me to comment about gall stones following vagotomy A lot of work is being done on the function of the gall-bladder, pylorus and sphincter of Oddi by Mr Capper's team in Bristol and I have somebody working with me at the moment on this subject I think that the only way of tackling this subject of gall-stones and vagotomy is to start measuring intra biliary pressures and assessing the degree of stasis This has been practised for many years in France and although most British surgeons frown upon what are called the biliary dyskinesias I think we shall have to look at it again

Professor Le Quesne Mr Franklin does your clinical experience lead you to believe that you see gall-stones after vagotomy?

Mr Franklin I don't think they are more common certainly I think they do occur with the stasis which sometimes follows a Polya gastrectomy In these circumstances I have seen gall stones form very quickly However, I don't think they are particularly common after vagotomy but we shall have to wait and see

THE MANAGEMENT OF UNCOMPLICATED GALL-STONES

By Dr F. Avery-Jones

Life is a matter of calculated risks and one of our functions as physicians is to attempt to assess the risks associated with certain medical conditions and sometimes also with the risks of treatment medical and surgical. For the purpose of this communication we are particularly interested in the silent gall-stone and the gall stones associated with some flatulent dyspepsia. It is in this group that there is some controversy about the need for surgical treatment. I would like to give you a personal example. My mother died when she was aged 92 from a respiratory infection. Forty years before her death she had had a urinary infection and an intravenous pyelogram demonstrated the presence of radio opaque gall stones packing her gall-bladder. She had no symptoms referable to the stones, either before or since, and nothing was done about them. Obviously in her case, the decision was fully justified by her subsequent freedom from biliary disease. Nevertheless we know there is a risk associated with the silent gall-stones and how lucky she was in escaping complications and how justified was my former chief in accepting this calculated risk on her behalf.

I draw your attention to two sets of figures in this respect. There is an excellent study by Graham Wilson and his colleagues in 1948 who followed up 112 cases of silent gall-stones over a period of 10 to 20 years. During this period 30 of the 112 had biliary colic and five developed jaundice. Cholecystectomy was performed on 24 patients. Some years ago I studied the incidence of gall stones by analysing the autopsy records of Hammersmith Hospital. The series related to the years 1941 to 1950 and we found 231 cases of gall-stones in about 3,000 autopsies and analysing these further we found that in 30 of the 231 patients i.e. 1·8 death was the direct consequence of the presence of these gall stones. This proportion of 1·8 is about the same as found in the Swedish series from Uppsala some years ago. Now six of the 30 Hammersmith deaths were due to cancer of the gall-bladder associated with calculi eight were caused by infections, seven from obstructive jaundice resulting from stone, and six as a result of operation. This gives one a picture of the magnitude of the risk associated with gall-stones, roughly a 3 per cent risk of cancer of the gall-bladder 12½ per cent risk of death precipitated or accelerated by gall-stones and a 25 per cent risk of subsequent colic. I suspect that the figures were lower for the years 1941–1950 than they are now. It is remarkable in fact the way the deaths from gall stones fell both in the First World War and the Second World War and there is no doubt that an affluent society does increase the incidence of gall-stones.

With this overall picture of the risks of gall-stones one has to consider where one's duty lies in advising patients. The size of this risk is just about the same as the risk to life associated with cigarette smoking and clearly with the figures put before the public there is a remarkable disinterest in taking action. It is our responsibility to weigh up the risk in individual cases and advise our patients

accordingly. I would therefore like to discuss some of the considerations which one has to take into account.

The first is the personality and commitment of the patient. There are some patients particularly business and professional men with busy lives, who have to travel and who wish to protect themselves against the hazard of suddenly being taken ill at an inconvenient time and in an inconvenient place. To them surgery in the absence of any reliable medical care is the obvious necessary answer and can be arranged to fit into their timetable. On the other hand there are patients who are extremely nervous of operations and anaesthetics and are very unhappy about the idea of surgery. Provided that there are no other special medical considerations one is entirely entitled to take a calculated risk on their behalf and to advise no operation. The second consideration is the general medical condition. Some patients already have another disease such as diabetes and such complications of gall-stones as cholecystitis, pancreatitis or jaundice might present an appreciable additional hazard. There is then a strong case for encouraging these patients to have the gall-stones removed under good conditions of health and without the added difficulties which might arise from complications. On the other hand if the general health is perfectly good, as in the case of my mother and there are no special considerations as far as the nature of the stone is concerned, it seems reasonable to take no action. Thirdly the characteristic of the stone has to be taken into consideration and it is likely that perforation of the duodenum and the passing of stones into the intestines with the risk of intestinal obstruction is particularly likely to happen with the large solitary gall-stone so that one should exercise a considerable bias in favour of cholecystectomy for large solitary stones even if they are completely symptomless. Again, patients with multiple small stones are at greater risk from biliary colic than those with medium sized gall stones packing the gall bladder who are the patients I personally tend to leave unless there are other considerations.

As far as the risk of cancer is concerned, there doesn't appear to be any special correlation with any particular type of gall stone and the distribution of association with cancer is the same with single cholesterol stones as with pigment stones and mixed stones. Patients very often ask if there is a risk of cancer and the answer is that it is about 3 per cent. Cancer, however, occurs in the older age groups; in other words, it is a small risk which one can off set against the risks of an elective operation. Admittedly, I think that 3 per cent is a high figure for elective cholecystectomy which, in good-condition patients I would have thought would be around 1 or 2 per cent.

In another group of patients, those with fatty dyspepsia and food intolerances, it is very necessary to make it quite clear that surgery is not going to benefit such symptoms. A number of these patients, in fact, have had a bilious tendency all their lives. As children they were bilious and were easily upset by cream buns and rich foods and this is often passed on to adult life, sometimes with a tendency to migraine. These patients seem to have a greater liability to gather gall stones

and having developed them and having had them taken away they continue to get identical symptoms These symptoms I suspect are probably due to a liver enzyme deficiency with failure to detoxicate by conjugation Lime juice and lemon juice seem to have a beneficial effect in some biliary patients and so do small doses of phenobarbitone which is now known to have a beneficial effect upon liver enzyme activity I have also found that an oral bile preparation called Destbyl taken with the main meals may be useful in reducing the bilious discomfort patients may otherwise suffer

Finally, the old concept of gall stones affecting women who are fair fat and 40, as had already been said is quite untrue and we ought to consider what advice we should give to the young gall-stone patient Gall-stones in women under the age of 30 are not uncommon They are very often mis diagnosed and in one series, Dr Vakil working in our department found that peptic ulcer, appendicitis renal colic, muscular pain and anxiety neurosis had been the presenting first diagnosis Quite often the pain may be rather atypical, tending to come on at night and may seem to indicate duodenal ulcer A number of cases of gall stones in younger women are associated with previous pregnancy, but not all of them, and those who have been pregnant are more likely to suffer severe attacks of biliary colic in the early months after delivery than during pregnancy Generally speaking the attacks of pain tend to be rather short and brief in the younger people nocturnal pain being particularly frequent and occurring as often in the epigastrium as in the right upper abdomen The stones are often multiple or radio translucent and I have no doubt that some of them may be missed from time to time The sex ratio of the under thirties is about six women to one man and in these younger patients one should exercise a considerable bias in favour of surgery even if the stones are silent

Is there any place for medical treatment? It has already been demonstrated that gall-stones can be passed and this is a very real phenomenon that one ought to keep in mind There is just a recent suggestion that cholestyramine, which we use in the treatment of the pruritis associated with jaundice will lower the serum cholesterol and it might conceivably reverse the tendency to gall stone formation I don t think it would dissolve stones but it might reverse the tendency and I think that this is a treatment we have obviously got to learn more about Now is there anything to dissolve gall stones? Claims are repeatedly made about such treatments in different countries and a few years ago I had a patient from abroad with biliary colic X rays showed very typical gall-stones and I advised cholecystectomy He said he would not have an operation and that he would return to his country and visit a famous doctor who was able to dissolve gall stones Well, you go back I said, 'and have your gall-stones dissolved' He went back and some months later a little parcel arrived with some stones accompanied by a letter in which he wrote These are the stones which I have passed and which you said needed an operation So I had the stones sent up to the laboratory and they were found to contain silica so they had obviously come from the garden path of the famous doctor!

DISCUSSION

Surgeon Lieutenant Commander Rivers I should like to present this case of a 53-year old man who in 1965 was travelling down the M1 when he was seized with lower abdominal pain which he described as 'coming and going' accompanied by a desire to pass water He got off the motorway and passed urine without relief The pain then became constant and he visited his general practitioner who noted that he was icteric His urine then darkened and he passed light stools He was investigated in the out patient department of another hospital liver function tests suggested an active hepatitis and he began to complain of lassitude and weakness and continued pain This continued through the summer He was reinvestigated in November by which time he was non-icteric, his urine and stools had returned to normal and so had his liver function tests although he felt little better in himself Over the winter of 1966 and the spring and summer of 1967 he made a slow return to normal health However in November 1967 following a further attack of much more severe abdominal colic, confined to the right lower quadrant he was admitted to hospital where he was noticed to have spider naevi a liver palpable two fingers below the costal margin and a palpable spleen Cholecystography and zonography revealed two gall-stones and a non-functioning gall bladder He was referred to our surgeons who felt that he would benefit from cholecystectomy and laparotomy was performed in February The gall-bladder was found to be fibrosed containing two stones The liver was covered with small nodules there were dilated veins in the falciform ligament and the spleen was enlarged to one and a half times normal size The gall bladder was removed and a liver biopsy performed Histology revealed the specimen to be uniformly involved by a cirrhotic process with eccentric central veins and a generalised infiltration predominantly lymphocytic in character

We wondered Sir what the Panel's views were upon the question of operation in the presence of hepatic cirrhosis?

Professor Le Quesne Thank you Dr Rivers — may we ask you a question first? What do you think was the cause of the original painful jaundice when he was driving down the M1?

Surgeon Lieutenant Commander Rivers I don't know Sir I only have another hospital's results to go on, but they did show apparently quite raised enzyme levels and I think we must accept their diagnosis of hepatitis Whether his cirrhosis was present at that time or not, and this was a further attack of hepatitis on top of that I'm afraid I am in no position to state

Dr Avery Jones I think there is an increased risk of gallstones in patients with chronic hepatitis and if they give rise to biliary colic and provided that the liver function is reasonably compensated I think that surgery is indicated and I would certainly encourage it.

Professor Le Quesne Now Dr Avery Jones's paper is open for discussion and questions

Dr Avery Jones I would just like to give you the follow-up of the patient I finished up with He came back to this country with obstructive jaundice this

you so I said All so your gall stones have caught up with you? But it wasn't so He was opened up by Mr Rodney Maingot who found a very large hydatid cyst with daughter cysts going down the bile ducts as well as gall stones in the gall-bladder!

Mr Franklin If I could just tell you about a very recent case with hepatitis and gall stones This was a woman who presented with colic and jaundice and gall stones were present We weren't altogether happy about the diagnosis because of changes in the blood chemistry but at operation she had gall-stones and I removed the gall-bladder She had also rather an odd looking liver and I took a piece for biopsy This was returned as biliary cirrhosis and definitely not like a hepatitis Anyhow she made a perfectly good recovery the jaundice settled and we looked around for a cause The only chemical we could implicate was the Pill which she had been taking for six years and we came to the conclusion that this must be an example of one of the ill effects of this Pill However only yesterday I heard that she had gone away with her husband to convalesce and that her husband has now got jaundice so since we can scarcely blame the Pill for that it does rather look as if it must have been a hepatitis with coincidental gall-stones!

Professor Le Quesne Dr Avery Jones just to make things more interesting I wonder if I could take issue with you on this question of the seemingly symptomless gall stones as it did occur to me earlier this week that it was likely you would direct your attention in this direction and I came across a very remarkable study that was published the year before last on 1,500 patients who had been followed up in Sweden A good many of these had had their gall-bladder removed but there were 780 patients who had gall-stones on X-ray diagnosis alone and for one reason or another received no treatment within a year of the diagnosis Now the interesting thing is their figures agreed almost entirely with yours but in the next 10 or 11 years 33 per cent of those patients had to have surgery I thought the really interesting thing they brought out in other studies was the very great difference in mortality following surgery for gall stones in people over the age of 60 as compared with those under the age of 60 They also found that of those who had an operation within one year of diagnosis only 16 per cent had stones in the common duct whereas in those people in whom for one reason or another operation was deferred for more than a year 27 per cent had stones in the common duct

They found an even more remarkable figure I think and I'll state it in its most challenging way first if you compare the operative mortality for patients over the age of 60 with stones in the common duct it is 50 times the operative mortality of cholecystectomy in patients under 60 without exploration of the duct Now it's fair to say that operative mortality for simple cholecystectomy is only 0·13 so 50 times 0·13 still only gets you to five I wonder if I can challenge you by saying that I think the problems you are facing with the patient who has got symptomless gall-stones provide a reason why you should remove the gall-bladder Mr Franklin will you give me any support in this view?

Mr Franklin It is rather difficult because I think everyone rather dislikes operating upon a patient who has had gall-stones discovered on routine investigation hasn't got much in the way of symptoms and isn't very keen on an operation I would never urge them to have an operation unless the stones were small and therefore might give trouble later on or if the patients are very young when I think you feel they are bound to get trouble sooner or later I think in so far as they're young and have small stones I would agree with Professor Le Quesne If they're older with big stones which are not giving symptoms I would then I think, agree with Dr Avery Jones

Professor Le Quesne What about Dr Avery Jones's proposition about one big stone?

Mr Franklin Well I think in an older patient I would not advise removal

Professor Le Quesne Dr Avery Jones do you think you should ever remove a gall bladder without doing a barium meal?

Dr Avery Jones I think that is a very good question The possibility of misdiagnosis is appreciable and I have seen several patients with achalasia of the cardia where they have had a quite unnecessary cholecystectomy because they have had pain in the back Gastric ulcer duodenal ulcer can of course get misdiagnosed and I think that is a very good point because sometimes the gall stone may be a red herring and there may be some other pathology The same is perfectly true of course with hiatus hernia and diverticular disease

Mr Franklin I intended to mention this in my paper presently but the stone which Professor Rains didn't mention was this very red herring type of stone which is a real clinical entity The patients have their gall stones removed and aren't any better and I think that you will all remember that a few years ago when hiatus hernia first got on the map it was very common indeed to meet surgeons who said they had just done a hernia repair and then they would add with a smirk that the patient had had his gall bladder removed a couple of years before Well I think smirking is a very bad thing in surgery and never pays Indeed I have had the opposite experience of having to take gall-stones out of patients who had had a hiatus repair two years previously! The really important thing is that gall-stones hiatus hernia colonic diverticulitis and duodenal ulcers all occur in the same type of patient and quite a few patients have the whole lot and sometimes you may be aware of that and not really sure which of these conditions is causing their symptoms

Surgeon Vice Admiral Caldwell Professor Rains did suggest that sugar might now be considered a factor in the aetiology of gall stones and I wonder if Dr Avery Jones as a physician would like to make any observations on that?

Dr Avery Jones I certainly encourage patients where there is any question of a raised cholesterol to cut down sugar because there is some evidence that it does alter the solubilities and may diminish the tendency of athero sclerosis The answer is yes I do I think it is a good point in management

Surgeon Captain Watt I would like to ask the Panel whether the behaviour of the gall-bladder on cholecystography is not a factor to be taken into account when

medical management is being considered. For instance would the Panel agree that a small tense gall-bladder which empties rapidly might be a point in favour of cholecystectomy whereas the long hypotonic gall bladder which is unlikely to cause attacks of biliary colic might warrant a more conservative policy?

Professor Rains. I've forgotten the word but the French love taking out gall-bladders that are long and drooped down alongside the vertebral column even if they have no stones in them. We have really got to do much more work on pressures and gall-bladder function and perhaps in the end we may come round to the French view.

Professor Le Quesne. I think perhaps there is one other point which might help Surgeon Captain Watt and I'm fortunate because the paper I read to arm myself against Dr. Avery Jones also covered this point. These people looked to see whether you were more likely to have symptoms if you had gall-stones with an obstructed cystic duct or gall stones with a patent cystic duct and apparently there is not the slightest doubt that one with an obstructed cystic duct is much more likely to cause symptoms. Therefore if you find a symptomless patient with a non functioning gall bladder the risk of that patient getting complications in the next few years is over twice as high as in a symptomless patient with gall-stones in a functioning gall-bladder. So possibly I would suggest that if the gall-bladder can contract they're better off.

Dr. Whiteside. Perhaps it only suggests that there's a stone in the cystic duct waiting to go on.

Dr. Avery Jones. In Holland they talk about the 'Yo Yo' gall bladder, which is rather Captain Watt's type. I think where the gall-bladder is actually seen going up and down in the X-ray. I would have thought that activity on the whole was a sign for not doing something rather than for operating.

STONE IN THE COMMON DUCT

By Professor L P Le Quesne

Stones in the common bile duct at least in this country almost invariably originate in the gall-bladder and pass down the cystic duct into the common bile duct We are less certain as to what happens to them once they get into the common bile duct As Dr Whiteside showed in his X rays some of these stones can pass into the duodenum this event being usually but by no means always, accompanied by an attack of pain Yet it is quite certain that many of them do not enter the duodenum and it would be very interesting to discover what are the chances of a stone passing down the common duct into the duodenum once it has entered the duct We do not know this but we do know however, that it does not necessarily mean that the stone has passed into the duodenum just because a patient has a severe attack of pain perhaps accompanied by jaundice which remits for many of these stones can remain in the common duct for months or even years thereafter without giving rise to further symptoms It would be quite wrong to think that whilst they are there these symptomless stones are not causing harm because they can cause changes both in the common duct and in the liver The common bile duct dilates and its walls become thickened but neither of these two events greatly matters unless infection supervenes causing cholangitis Possibly of more importance are the long-term effects of stone in the common bile duct on the liver Liver biopsies taken from patients with longstanding evidence of stone in the duct reveal disintegration of the liver architecture with retention of bile pigment within the liver cells The damage becomes more severe if as already mentioned infection is superadded In these circumstances a liver biopsy will show the bile ducts filled with pus This is an extremely serious complication of gall stones and the operative mortality of patients with stone in the duct associated with cholangitis is very markedly higher than in those in whom infection has not supervened It is these two changes in the liver brought about by longstanding stone in the duct, that is to say actual liver cell damage and infection which together make stone in the common duct such a dangerous complication of gall stones quite apart from the fact that it may be an extremely painful and unpleasant complication for the patient

Now, if stones can remain in the duct for many years without giving rise to symptoms our attention must be drawn to the problem of the diagnosis of the condition In the typical text book case, the diagnosis is straightforward and characteristically the complication occurs in a patient who has previously had dyspepsia and who then gets an attack of severe so called biliary colic associated with jaundice which is typically transient and accompanied by dark urine and pale stools There are one or two points to mention about the features of these attacks First of all I was extremely interested when Admiral Caldwell drew our attention at the beginning of this meeting to the fact that the patient he saw had *continuous* pain This term biliary colic is very misleading it is extremely uncommon for a patient with a stone in the bile duct to have a true colic by which I mean a pain which comes and goes in waves. Almost invariably the patient has constant pain

which fairly soon reaches a plateau, remains like this for a number of hours and then remits. It is not surprising that this is so because a true colic arises through excessive contraction of smooth muscle and there is extremely little smooth muscle in the biliary tract. Except for that surrounding the lower end, there is almost none in the common duct so that this term on which we were all brought up, biliary colic is in fact misleading. The other important feature about the pain is that it is most commonly in the epigastrium it is typically central in the abdomen and may radiate out under either costal margin. This again is at variance with the text book description of the pain which particularly radiates under the right costal margin. Radiation through to the back is a much commoner feature.

In many instances the clinical picture is atypical. Jaundice may not be a feature of the illness or if it is may be so slight as to pass unnoticed and the patient may merely present with one or more severe attacks of upper abdominal pain. One is then presented with a differential diagnosis of stones in the gall-bladder, possibly pancreatitis, possibly peptic ulcer, there are a great number of conditions which it may mimic. Similarly, pain may not be a very marked feature of the illness, indeed it may be absent and the patient may present with jaundice. One is then presented with one of the classical differential diagnoses of medicine the differential diagnosis of a patient with jaundice. Then just to make it difficult, sometimes not only is the jaundice painless but it may have unusual biochemical features characteristically the biochemical features of stone in the duct will be that the raised serum bilirubin will be accompanied by a raised alkaline phosphatase, normal levels of the flocculation tests and very little rise in enzyme activity. But this isn't always the case and I have recently had a patient with a painless jaundice which steadily got worse a perfectly normal alkaline phosphatase and perfectly normal flocculation tests. A barium meal was then done to see if it could throw any light on the condition and indeed it did for it showed the cause of the jaundice to be a gall stone lying in the intrapancreatic portion of the bile duct emphasising the difficulties that there may be in the clinical presentation of a stone in the common bile duct.

It is, of course, as Dr Whiteside has pointed out uncommon to see direct X ray evidence of a stone in the duct and we are therefore left with the situation that, in a considerable number of patients on clinical and simple radiographic grounds the diagnosis of stone in the common bile duct may be very unreliable. This has been realised for many years and led to the very wide indications for exploration of the common bile duct that were recommended by a number of surgeons. The classical indications for exploration of the duct are a patient who has been or is jaundiced; a patient who has recently had severe pain and a patient who has a distended common bile duct at operation. Because of the difficulty of making a correct diagnosis these indications were extended and in many text books of surgery you will see 10, 11, 12, 13 indications for exploration of the bile duct the essence of which is that apart from the classical indications every patient with multiple stones in the gall bladder should have his ducts explored because of the possibility of there being a stone there.

There is no doubt that this policy greatly increased the harvest of stones from the common bile duct and diminished the incidence of residual stones after cholecystectomy but it by no means solved the problem The incidence of residual stones following exploration of the common bile duct remained high and even with very wide indications for exploration of the bile duct figures published by the leading clinics in the world indicate that there is still an incidence of residual stones of somewhere around 7 to 10 per cent Another drawback to this policy is that it commits the surgeon to exploring a very large number of ducts which in fact contain no stones and in a number of recorded series stones were found in the common bile duct in only around 40 per cent of all the ducts that were explored Taking it the other way round no stone was found in 60 per cent of the ducts that were explored Now it is perfectly true that a simple exploration probably does not add significantly to the mortality of cholecystectomy but it does add to the morbidity of the operation and it certainly does add to the length of the patient's stay in hospital and clearly this should be avoided if possible

With the development of modern radiographic techniques and the refinements of modern operative surgery the problem of stones in the gall-bladder is one which to a large extent, has been solved except for the type of problem that Dr Avery Jones was discussing The real difficulties facing the surgeon in this field, I would suggest are whether there is a stone in the common bile duct and whether, having explored the duct, he has in fact carried out a complete and successful operation and removed all the stones, bearing in mind that residual stone is commoner after exploration of the bile duct than it is in patients who have never had their common duct explored How then do we know when to explore the duct and how do we know we have explored it successfully at the time of operation? A great number of different techniques have been applied to this problem in the last few years one being the use of intravenous cholangiography which Dr Whiteside has already mentioned There is no doubt that this technique can show stones in the common duct but it is not completely dependable and an apparently normal pre operative intravenous cholangiogram does not in my opinion mean that that duct does not contain a stone

There is also the time factor to be considered What the surgeon wants to know is not that there was no stone in the common bile duct yesterday, but that there is not one there today, when he is operating on the patient. This is important because I think it is very likely that some of the stones removed from the common duct were not there when the anaesthetist gave the anaesthetic, they were pushed into the common duct from the gall bladder by the surgeon manipulating the gall-bladder There are therefore good theoretical reasons for believing that intravenous cholangiography is unlikely to be the final answer however good the media we may get

Without doubt the single most important technique that has been applied to this problem is that of operative cholangiography which involves the instillation of radio opaque material into the bile duct at the time of operation The patient has to be positioned over a special box on the operating table into which the X-ray

catheter can be inserted The dye can be injected into the common bile duct by a needle but the easiest and most certain way of doing it is to insert a catheter through the cystic duct into the common bile duct, great care being taken to ensure that air bubbles are not introduced into the common duct at this time Once the catheter has been inserted it is important to tilt the table to the right, through about 5 to 10° to throw the shadow of the common duct clear of the spine Every detail of the technique is important if good results are to be obtained consistently and there are also important details in the interpretation of the films details which greatly depend upon an appreciation of the normal anatomy of the common bile duct As shown by the studies that Mr Bernard Hand made at the Middlesex Hospital the main portion of the common duct is a wide tube with thin walls but just as it reaches the duodenal wall the wall of the bile duct thickens with the result that the terminal part of the common duct has a very narrow lumen This sudden narrowing of the lumen which is accompanied by an appearance of notching is perfectly normal but in years gone by it was frequently interpreted as a stricture of the lower end of the common bile duct

Three films are normally taken the first after the injection of 2 to 3 ml of contrast medium the second after 4 or 5 mls and the third after 7 or 8 mls In order to be passed as normal an operative cholangiogram has got to satisfy five criteria. Firstly there must be a completely free flow of contrast medium into the duodenum even on the first film Secondly, the 'notch' or narrowing between the main portion of the duct and the whole length of its very fine terminal portion must be clearly seen Thirdly the duct must be of normal calibre as already mentioned by Dr Whiteside Fourthly and obviously the duct must not contain a filling defect which might signify a stone and fifthly there should be no excessive intrahepatic filling I particularly draw your attention to the importance of the first film using a very small quantity of dye because once a moderate amount of dye has been injected it frequently happens that the lower portion of the duct is obscured by the medium in the duodenum and some of the surgeons who first employed cholangiography dismissed this technique as not being helpful because they took their first film after injecting 7 or 8 mls and accordingly were unable to see the lower portion of the duct

I am not going to put before you in detail evidence of the value of this examination except just briefly to say that I think it is now conclusively proved that by the use of this technique provided that it is scrupulously interpreted an increased yield of stones will be obtained from the common duct, but what is far more important unnecessary exploration of the common duct is cut down enormously My colleague and I followed up nearly 100 patients who had had a normal operative cholangiogram which was used as the main indication not to explore the duct these patients were examined a year or more after operation, when they all had intravenous cholangiograms and there was no evidence that a single one of them had a residual stone In the light of this and other evidence I think we can take this examination as being the best evidence we have at the present time as to whether or not a duct contains a stone.

If the duct contains a stone clearly it must be explored I don't intend to go into the technical details of this routine surgical procedure to any extent but wish to stress three points Firstly the operation not only involves the removing of stones but also involves demonstrating beyond doubt that there is a free passage into the duodenum The usual way of doing this is to pass a probe However the probe may easily stick in the ampulla and when palpated through the duodenal wall appears to be in the lumen of the duodenum when it is not Since it is important to be absolutely certain that the bougie is in the duodenum the easiest and most certain way of doing that is by feeling the cuff of the ampulla around the emerging bougie

Secondly patients who have a dilated common bile duct with multiple stones present special difficulties and one then has to be certain that stones are not left in the lower end of the duct after exploration Generally speaking two techniques may be used to overcome this problem one particularly championed by Mr Capper at Bristol is to ignore the debris at the lower end of the duct and anastomose the common duct to the duodenum In his hands choledochoduodenostomy appears to be a successful operation Yet there is a considerable number of surgeons who would tell you that this operation is followed by an unacceptable incidence of various complications and the alternative procedure one which I personally prefer is to open the lower end of the common duct through the duodenum and explore the duct from both directions There is no doubt that one cannot be certain about the exploration of the common duct simply from above if there are multiple stones

The third point poses this question how can we be certain that our exploration has been completely successful? Well after carrying out explorations as have already been suggested the duct should be washed through and then I think the final post-exploratory cholangiogram should be carried out I would like to emphasise the difference between these two types of cholangiogram The pre-exploratory cholangiogram is performed to tell us whether or not the duct contains stones that is to say whether it does or not need exploration The purpose of the post exploratory cholangiogram is to tell us whether or not the exploration has been completely successful This is done by first putting a T tube in the common duct and flushing it through with a large quantity of saline to get rid of bubbles before again injecting contrast medium This is not such a sensitive examination as the pre exploratory one for the important reason that even if the duct contains no stones flow into the duodenum cannot always be demonstrated This presumably is because there is oedema and spasm at the lower end of the duct and so for practical purposes the only criterion upon which one can rely is the presence or absence of a filling defect as opposed to the five criteria of the pre exploratory cholangiogram However this is a technique which undoubtedly will show residual stones on occasion and in our hands in something like 3 or 4 per cent of cases it shows us that we have left a stone behind

DISCUSSION

Surgeon Commander Tooley To illustrate the problem of multiple stones in the

common duct this is a lady of 35 who presented in January 1964 with recurrent abdominal pain and jaundice and cholecystography revealed a non functioning gall-bladder At operation a thick-walled gall bladder was packed with stones and a very dilated common duct contained innumerable stones which proved difficult to demonstrate by pre exploratory cholangiography After removal of the gall-bladder over 100 stones were removed from the common duct but many were intramural and defied extraction The transduodenal approach to the sphincter just described by Professor Le Quesne was carried out and residual stones were removed However post exploratory cholangiogram revealed residual stones in the hepatic ducts and no free flow into the duodenum The residual stones were removed from the hepatic ducts and finally the last stone at the tip of the common duct which had in fact ulcerated through the duct wall necessitating a choledochoduodenostomy The final cholangiogram through the T-tube was then satisfactory A cholangiogram two months later was normal and she remained fairly well until she returned to us again in September 1967 with recurrent abdominal pain but no jaundice and it was thought that perhaps she had developed further stones However, thorough investigation including intravenous cholangiography revealed no evidence whatsoever of disease of the biliary system I would like to ask the Panel to comment upon the management of this case

The second case is a 51-years-old male who was referred from the Orthopaedic Department with pain in the back and who had had recurrent bilateral calf pain for the previous three months When first seen he looked very unwell but the only abnormal physical signs were a liver enlarged to three fingers breadths below the costal margin and marked tenderness in the right upper quadrant The relevant investigations at that particular time were a rising alkaline phosphatase the starting value being 50 units and rising over the ensuing days to 200 to 300 units Shortly after admission he developed jaundice and collapse and consolidation of the lower lobe of the left lung He was found to have a non-functioning gall bladder and bronchoscopy was also performed as we were thinking in terms of a possible carcinoma of the bronchus However he then became much more rapidly jaundiced the alkaline phosphatase continued to rise and laparotomy was therefore carried out He had a very large inflamed oedematous gall-bladder packed with stones and an indurated mass in the porta hepatis obscuring the common bile duct The cholangiogram proved extremely difficult to perform and did not demonstrate the common duct terribly clearly In fact it was necessary to do a direct needle puncture of the common bile duct There was no proximal flow at all and biopsy material from the hepatic ducts and liver revealed carcinoma of the ducts with invasion of the liver The post-operative period was fairly short and uninfluenced by thio-tepa infusion

I would like the Panel to comment on this last patient who was full of technical problems at operation certainly in finding the common bile duct and then in dealing with what we found and interpreting the operative cholangiograms

Professor Le Quesne There are two or three comments I would like to make about the first case One of the unsolved problems of biliary surgery

is the removal of stones from the hepatic ducts it can be extremely difficult and frustrating My own feeling is that if you have small stones impacted low down in the common duct the only way you can be certain of getting them out is to open the duct from below as well as from above and I think that this is a perfectly safe operation provided that you put the incision in the duct at what you might call 10 o'clock' opposite the opening of the pancreatic duct. I personally always like to put a bougie up the pancreatic duct at the end of the operation We call this operation 'sphincterotomy' which is of course a great misnomer for if you do a T-tube cholangiogram after the operation the radiologist will not be able to tell whether you have done a sphincterotomy or not So you haven't seriously I think interfered with the physiology of the lower end of the duct but you have made your exploration much easier The other comment I would make about the case is that I personally am not very happy about the use of a long limbed T tube

Surgeon Captain Watt May I explain that I don't think it was made clear that there was finally one large stone at the end of the common duct which had actually eroded through the wall and after this was removed there was a hole through the wall of the duct at its junction with the duodenum so that it was then necessary to re implant the common duct into the duodenum and we therefore put a long limb of the T-tube which we don t of course normally use through the stoma

Professor Le Quesne Just to be really provocative I would still just wonder if there is any logic in the belief upon which I know we were all brought up that putting tubes across anastomoses, confers any benefit on the patient. I've always put short T-tubes in the few common ducts that I have re-implanted into the duodenum and I would be very interested to know what Mr Franklin thinks about that As regards the second case so far as I know this problem of carcinoma of the intrahepatic ducts is an insoluble one The thing which interested me very much is the way in which the alkaline phosphatase in that patient rose apparently long before the serum bilirubin and was disproportionately high I think for reasons which nobody understands this is a fairly characteristic biochemical situation with carcinomas of the hepatic ducts themselves and papillary tumours of the lower end of the common ducts Exactly why this should be nobody knows but it is quite characteristic

Mr Franklin Well I was most interested in those two cases and I agree that the treatment of carcinoma of the ducts in my hands, is a most unrewarding exercise almost impossible to deal with I think as regards debris and difficulty at the lower end I have been very impressed with the success of choledochoduodenostomy provided that the common duct is dilated I think that is the important thing As for making sure that you have really got an instrument into the duodenum the only certain test which I know is to put a gum elastic catheter into the duct and distend it with saline making sure that nothing is running back

Dr Avery Jones I would like to confirm the point about the alkaline phosphatase it rises early with duct obstruction and I am particularly on the look out for it with the ampullary carcinomas when the alkaline phosphatase may be quite high with no jaundice and I am sure that this is a useful diagnostic point to keep in mind

Professor Ruins One of the other little points about the alkaline phosphatase that I have found is that it rises early but it sets late That means that if you relieve the obstruction you will see the bilirubin levels falling but will find that the alkaline phosphatase may remain elevated for even a number of months

Dr Whiteside Only one short comment When we first started to do transhepatic cholangiography in 1953 one of our earliest cases was a case of carcinoma of the common hepatic duct The diagnosis was made by this technique and when the patient came to surgery they knew what they were going to find I think that possibly if this condition is suspected then transhepatic cholangiography might have a place here and possibly save the patient an operation

Professor Ruins Do you think we might have some questions? It is a very very big subject

Mr Robert Campbell I should like to make a plea for the abolition of the T tube. I think that people have got into a habit of inserting T tubes into common bile ducts but if you do use a T tube you should cut it down to the point where it hardly looks like a T tube I personally prefer a plain tube because I think the damage done to the bile duct by pulling out the T tube is very considerable and I would like to know what the Panel would think about abolishing T tubes? The other question concerns this peculiar concept of Oddi's inflammation and stenosis of the sphincter of Oddi The French are believers in this and feel that in some people, a primary stenosis or obstruction of the ampulla can occur and that the resulting stasis may play a part in the formation of gall-stones This I think is the reason why they are so keen on manometry and if they find that the pressure is high they will then carry out transduodenal sphincteroplasty I would also like to support what Professor Le Quesne said about excluding air bubbles from the bile duct when doing an operative cholangiogram but this is easier said than done and I have noticed that French surgeons who are keen on this technique seem to take few precautions against air bubbles and then spend hours looking for imaginary stones Even in the hands of the experts it appears extraordinarily difficult to exclude these air bubbles

Mr Franklin I can see my paper gradually disappearing! I would never use a T tube in ordinary circumstances I am always rather diffident about mentioning this at all and particularly in the context of the very friendly nature of our discussion and with Professor Le Quesne on my left I think the T-tube is used because everyone has been brought up to do it and on commonsense grounds you would think that failure to use a T tube would be bound to lead to biliary peritonitis a fatal or at least very serious condition In fact, if you close the duct meticulously put a drain down to it and keep it there accurately bile appears for the first day or two just as if it were inside the bile duct The soft T tube probably does no harm but the fact that when you take it out you leave a natural hole in the common duct must in some cases give rise to stricture but I won't give you my paper just yet!

Professor Le Quesne I on the whole believe what Mr Franklin says about T tubes I was brought up to use T tubes but I think I would agree that the evidence in

most cases is that they are unnecessary Probably stimulated by today I shall start giving them up and I shall let you know if there's trouble! As regards the sphincter of Oddi syndrome I find this extremely difficult because I don't think I have ever seen a patient whom I was convinced was having symptoms of some thing wrong with the lower end of the bile duct, and in whom it was absolutely certain that at some stage in the proceedings there had not been a stone through the duct In other words I doubt if you can get a primary fibrosis without ever having had a stone in the duct

Mr Franklin I will get rid of another bit of my paper because I don't believe in it either!

Professor Le Quesne As regards air bubbles, having been taught by Dr Whiteside I don't think it's actually true that it is easier said than done. I think it really only involves attention to one or two very small details I think Dr Whiteside would agree that in the last six or seven years bubbles have ceased to be a problem for us

Dr Whiteside I can't remember seeing bubbles in operative cholangiography for several years

Dr Avery Jones The diagnosis of biliary dyskinesia which is so popular in France, we don't ever seem to meet But nevertheless I think it is possible for biliary pain to arise in patients even in the absence of stones and I see it as mentioned earlier in the bilious population some of whom may get an appreciable amount of discomfort in the upper abdomen following a fatty meal and yet they have no X-ray evidence of stones The other group of patients we should remind ourselves about is the patients with depression I would just like to add that I do believe in ampullary stenosis, even though I am not a surgeon but I will admit that possibly they don't give symptoms until after a gall bladder is removed and this was the point I was making about the safety valve effect of a distensible gall bladder

Dr George Duguemans I m in General Practice and one of my patients was sent home with T-tube drainage The relatives sent for me at about 10 o'clock one evening saying that the tube had gone We searched the bed but there was no tube there and I asked what had happened She said that she had felt some movement and pulling up her nightdress she saw the tube starting to disappear until it was sucked in spiggot and all I rang up the hospital and explained what had happened but it was evident that they disbelieved me At any rate, they took her in and two days later she passed the tube, plus spiggot intact I would like to ask the Panel if they can tell me exactly what happened?

Professor Raiz One explanation might be that the tube was lying in an abscess close to the intestine which had ulcerated into the colon or small intestine We have seen people who have passed cellophane per rectum which had been wrapped round an abdominal aneurysm and of course swabs can be passed in the same way It does give me the opportunity to tell you of the most extraordinary case of a woman who suffered from a biliary fistula for many years until eventually she had to wear an appliance before she could attend social functions and so she came to see if there was anything further that could be done A sinogram showed a

large filling defect in the common bile duct and at operation we found two or three yards of ribbon gauze in the common bile duct. She got better and before she left hospital, we asked her to tell us more about how she coped with her social programme and she said 'I used to bung up the hole with ribbon gauze'[1]

POST-CHOLECYSTECTOMY PROBLEMS

By R H Franklin

I feel that a lot of my paper has been gradually whittled away during the course of the day I was going to talk about — and I m very glad I haven t got to do so — the reasons why a patient may not be cured after a perfectly straightforward cholecystectomy Those cases are rare and Dr Avery Jones has touched on them The second group are those in which there is associated but unrecognised pathology and the gall-stones are just a red herring Again I think we have dealt quite adequately with this group That leaves me with the third group where there has been an operation for gall stones and damage has occurred or a stone has been left behind In this country this is a comparatively rare occurrence and most of the cases as you all know come from elsewhere No one has very many cases of their own they are all cases referred to them and the actual figures are therefore difficult to arrive at Maingot I think regards them as being about two cases per thousand cholecystectomies but the important thing is that of these cases, something like a third of the patients will die fairly quickly and of the remainder about another third will die as a result of various attempts to cure their troubles so it is obviously a very serious condition and one which ought to be avoided Now I thought that I would talk about a few representative examples and then discuss the cause and treatment and what I think is even more important the prevention of these injuries

The first case is a woman who came under my care in 1952 following exploration of the common duct and T tube drainage She had been suffering from attacks of cholangitis We made further enquiries about the operation and found that in fact it had not been the straightforward cholecystectomy we had imagined There had been an abscess at the junction of the cystic and the common bile duct and when the surgeon had removed the gall-bladder he had found a gap and the severed duct had been joined over a T-tube which the surgeon had left in for some three weeks Her cholangitis settled down and although she had recurrent attacks I did not see her again until 1956 when she was jaundiced I explored her and found that the common duct had practically disappeared and the duodenum was closely attached to the liver On separating this mass of dense fibrous tissue I was able to reveal two holes the orifices of each hepatic duct into the liver I made a Roux en-Y anastomosis and because there was already a lot of fibrosis put a T tube into each hepatic duct and retained them there for five months That if I may digress is the real indication for a T tube and the idea of leaving it in for some time was to make sure the fibrosis would become consolidated and not contract further That patient lived for a further 15 years but she had recurrent attacks of fever and slight jaundice and also developed osteomalacia dying eventually at the age of 71 of biliary cirrhosis and hepatic coma Although she lived quite a long time, she had a lot of ill health all of which was attributable to the original injury and it does illustrate the fact that whatever repair is used there is always a tendency for the stoma to constrict and for cholangitis to recur

The next patient's story was a very sad one In 1950 she had jaundice which lasted for two weeks and then settled In 1956 she had very severe pain and jaundice and at this time she had an operation We haven't many details The gall-bladder contained stones and was removed and the common duct was explored but no stones were found She made a good recovery but in January 1957 her jaundice returned and continued until June In September when I saw her we discovered on taking her history that her two sisters had had trouble with their spleens and one had died On investigation we found she had congenital elliptocytosis She was deeply jaundiced and at operation I found a stricture in the common bile duct which I repaired over a T-tube and I took out the spleen Although we left this T-tube in for five months when we eventually took it out she became jaundiced again In order to stop the continuing fibrosis I put a vitallium tube into the mass of scar tissue which was surrounding what had been the common duct and immediately she became free of jaundice and got perfectly well That was in 1958 Two years later in February 1960 the tube was still in position and she was well and symptom free with a healed wound Six months later the tube had disappeared although she was unaware that she had passed it Now in 1968 before this meeting I took an intravenous cholangiogram which shows everything to be perfectly satisfactory

A man of 28 had a cholecystectomy because of two large calculi in the gall-bladder The common duct was normal and the operative notes state that the ligature was placed at the junction of the cystic duct with the common bile duct I do not know whether this was a planned procedure to avoid the cystic duct stump syndrome about which we have heard a great deal and which has led to this rather dangerous advice and it may have had something to do with this patient developing jaundice on the second post operative day An intravenous cholangiogram showed no outline of the biliary system At operation a dilated common bile duct was found Aspiration revealed white bile and the duct was explored from the duodenum A short stricture was found a 5 mm polythene tube was drawn through the stricture and a separate T tube was introduced through a separate choledochotomy just above the upper end of the plastic tube He improved for a time and later that year the T-tube which had been retained showed good passage of dye into the duodenum The T tube was removed he then developed a biliary fistula Two months later he came under my care with a persistent biliary fistula At operation I removed the polythene tube from within the common bile duct and although we could only pass small bougies into the duct from the duodenum we were able to dilate it and felt that there was no justification for further interference at that time However he continued to have recurrent attacks of jaundice and eventually on re exploration was found to have dense fibrosis similar to that found in the patient previously mentioned and the only thing that seemed feasible was to use another prosthesis in this case a Y shaped vitallium tube with one limb going into each of the hepatic ducts and the vertical limb into a Roux en Y loop of jejunum The patient got on extremely well after this he had no further complaints and after the tube disappeared a Pepsicolagram showed the ducts patent and outlined by air

These prostheses were used for a time but were given up because they became blocked with debris and I think that our success in these cases has been due to the simultaneous use of Zanchol. Zanchol as you know, not only increases the amount of bile secreted but also reduces its viscosity and it does seem to prevent these prostheses blocking up. Normally, anything in the way of an indwelling tube is to be deprecated, but there is a place for them where damage already exists.

Another type of problem is illustrated by the next case, a patient of 63 who in 1948 had a cholecystectomy for cholelithiasis. The common duct is reported as having been explored with sounds via the cystic duct stump and nothing was found. She remained perfectly well until 1967, 19 years later, when she entered a medical ward with jaundice associated with pyrexia and investigations revealed a positive leptospira agglutination test and an intravenous cholangiogram showed a stone in the common duct. After treatment for the infective cause of her jaundice I operated on her and found a grossly dilated common duct with a single large stone at its lower end and a very hard, gritty ampulla. Now this is the sort of patient in whom a choledochoduodenostomy may be a good procedure and, provided that the common duct is widely dilated, I do not think it does any harm. I therefore carried out this technique in this case.

The next patient was a man, again in his fifties, who had had a cholecystectomy and two days later became jaundiced. On re-exploration he was found to have an injury of his common bile duct, a T tube was inserted and his jaundice immediately improved. He had the T tube removed and when he came under my care in 1966 he had a biliary fistula. Exploration revealed a localised stricture and it seemed to be a very straightforward thing to excise the stricture and repair the common duct by end to end anastomosis. He remained well for one year, then became jaundiced and a pre-operative percutaneous transhepatic cholangiogram revealed a stricture in the common bile duct with a suggestion of indentation in the left hepatic duct. At operation we considered the possibility of a carcinoma of the duct but frozen section did not show any malignancy. A T tube was put into position and the patient still retains it. We have taken serial cholangiograms and a rather significant feature is that the common duct now seems to be occupied entirely by the tube at the essential point, so that we are still not certain that this patient has not got a neoplasm.

These cases demonstrate the extremely dangerous position of the patient once an injury of the common bile duct has been sustained and I think it also true to say that whatever the method of repair, there is always a great risk of recurrent fibrosis and even though the patient may remain quite well recurrent cholangitis is very common and he will never be quite free of the risk of some severe complication. So we are faced with the importance of trying to prevent injury to the duct and of not overlooking any stones. There is no question that operative cholangiography has done a great deal to prevent leaving a stone behind but it does not in any sense remove the importance of extreme care because an operative cholangiography will not always show 'grit' or 'sand' and it may well be necessary to explore the duct even when the X-ray seems perfectly straightforward. Also

the X ray must be done by an expert to avoid the false security which allows some little stone to be missed On no account must an X-ray be regarded as absolving the surgeon from the responsibility of taking extreme care and I will refer again to the very good test of patency of introducing a gum elastic catheter into the duodenum and making sure that fluid can run freely through into the duodenum and that none returns Professor Le Quesne's point about feeling the shoulder of the ampulla is a good one but I have not always been certain that I could do that If the duct is very dilated and a lot of grit is present it is often quite a good idea to pack the common duct with tape when little bits of grit can be found adhering to the surface as it is removed

Then comes the question of the T-tube which to my mind is not usually necessary It is of course of great value 10 days later in finding the stone that ought to have been found at operation! If you can be certain that the duct is empty it is safe to suture it The incision in the common duct is closed with interrupted sutures using very small needles and very fine catgut and preferably taking in only the outer walls of the common duct The drain must then be anchored right down to the common duct. All this is extremely important and I never publicise this technique for the very reason that unless it is done with the greatest care and skill it will invite the risk of bile peritonitis I therefore never put this forward except to a very intelligent audience! I think the drain should be a soft rubber tube, not plastic material of any sort and one of the sutures in the duct should be left long enough to take two bites of the drain and draw it up exactly to the required position The tube will not come out inadvertently but will be perfectly easy to remove whenever it is desired to do so which is usually about five days after the operation

I would like to stress the importance of putting in the drain accurately and making sure that it does lie where it is meant to be, otherwise this can be a very dangerous method We have followed up a great many cases and there was no instance in which we could attribute any complication to not using the T tube with the exception of one case When we looked into that, we found that the operation had been carried out by a distinguished surgeon who was not a member of our team and who was rather taken with the idea He had not in fact attached the drain to the duct it fell but had just put it in rather hopefully where he thought it ought to be and he had also used a very small drain The patient came to no harm but she had to be re explored quite quickly again That was the only case in a long series and it is significant that the method had not been properly applied

Some strictures of the common bile duct following straightforward explorations may possibly have arisen directly because of the T tube We all know of strictures which have occurred following the most careful technique and Mayo Robson failed to find a cause in 70 per cent of cases of stricture of the common duct I am quite prepared to admit that this is a very rare complication of the T tube but I think it is a perfectly reasonable argument for leaving it out if it can be proved safe to do so

I did not intend to talk about this and it is only a side issue What is far

more important is the technique of the original operation for cholecystectomy We have Professor Le Quesne here and one of his famous predecessors at the Middlesex Sir Gordon Gordon Taylor was fond of saying that an acute gall-bladder was easy to remove in the acute stages if it was done early enough I think in the hands of Gordon Taylor it was perfectly true but it has encouraged a lot of people to do an immediate cholecystectomy in acute cholecystitis There's nothing wrong at all with that if you are an experienced surgeon and if you get the cases early My own experience of acute cholecystitis is that you do not get them early enough, because cholecystitis is not quite so urgent as appendicitis and patients may not be seen for several days In these situations cholecystectomy can be a very dangerous procedure particularly when the surgeon is inexperienced Cholecystectomy can often turn out to be very much more difficult than anticipated The anatomy of the cystic duct cannot be demonstrated clearly yet surgeons struggle determinedly through a difficult cholecystectomy because of pride which is ultimately the greatest cause of damage to the common bile duct in our patients I am quite sure that no one thinks any the less of the surgeon who explores the patient finds these difficult circumstances and says 'I am going to open the gall bladder and take out the stones and do a cholecystostomy for as Grey Turner observed, it is much better to be left with a living problem rather than a dead certainty

The other type of case which I am sure we have all experienced is the very easy cholecystectomy In fact it is so easy that the gall-bladder practically falls out and it is only after it has fallen out that what you thought to be a very easy cystic duct was in fact part of the common bile duct or right hepatic duct Grey Turner always made a point of examining the gall bladder after it had been removed He taught that the surgeon should cut carefully down the cystic duct and if he found a T junction at the end of it damage to the ducts was indicated

To summarise therefore, all structures must be identified before any operative procedure is carried out If the operation is an easy one it is worth pausing for a moment before anything is tied and finally it can be dangerous to tie the cystic duct too close to the common bile duct I would rather risk a cystic duct stump syndrome although I have only ever seen one myself and my impression is that it is uncommon except possibly when the cystic duct is very long In any event it can be tied reasonably short without being flush with the common duct With regard to the actual techniques of cholecystectomy there are two schools of thought those who tie the cystic artery first and those who tie the cystic duct first I belong to the latter school because by tying the duct first the dissection of the gall-bladder can be started before securing the cystic artery The artery is then tied when it is well clear of the right hepatic duct and the right branch of the hepatic artery

SUMMARY

Professor Rains

A study of the aetiology of gall stones takes one into the past through the realm of human biology right into the realm of natural science and I do not

think we are going to get much further with our understanding of gall stones without the assistance from crystallographers and physical chemists I am almost certain that time will show that gall-stones will have to be accepted as a bane upon the human race and in many cases is caused by affluence and diet I think gall stones will always be with us They were with the Pharaohs and they will be with us a thousand years from now

When it comes to managing patients with gall stones you will have noticed, firstly what a tremendously important role the radiologist plays in gall-stone disease You will have seen throughout the whole symposium that we have had countless X-rays and cholangiograms and really a surgeon cannot do this difficult work without having expert radiology available If any of you are in doubt about becoming a cholangiographer or cholangiographist or whatever you like to call a surgeon who does routine cholangiography I hope you have been convinced that it is important to do it routinely and not on the odd occasion when you think you need help

The other thing which I think this symposium has stressed about the management of the gall-stone patient is that management is a sequence of action and caution — action caution thinking all the way through When, for example gall-stones have been found accidentally in a perfectly well-functioning gall-bladder Dr Avery Jones has shown us exactly why we must stop and think Patients should not be pushed into operation just because we accidentally find gall-stones The doctor must make up his mind whether it would be in the best interests of the patient to have the gall stones removed

The action, caution action caution sequence must also be followed when dealing surgically with gall-stones for the surgeon must ensure the bile flows freely all the way from the liver to duodenum the patient cannot grow another bile duct That is the principle in biliary surgery and all management must be tempered with this thought

It was appropriate to hear Mr Franklin refer to the cautionary aspects of the teaching of the late Mr Grey Turner particularly in his reference to a living problem being better than a dead cert — a good thought to go home with

I should like to bring this symposium to a close by reminding you once more that gall stone disease is extremely common Twenty per cent of women of child-bearing age have gall stones 20 per cent of men over the age of 70 have gall stones you can get it in children you can get it in neonates you can get it in premature babies and it is a hundred times more common than urinary tract stones. It is a very very common disease and I repeat that I think it will always be with us

History has been written large with gall-stones In the realm of literature Sir Walter Scott suffered for most of his writing life from gall stone colic and so did the essayist Montaigne In our time we have seen political decisions affecting contemporary history influenced perhaps by an attack of suppurative cholangitis It is fitting therefore that in a naval hospital and at this time of the day that I

remind this audience that Alexander the Great is supposed to have died from pancreatitis associated with gall-stones on the night after he had dined with all his Admirals!

Clinical Notes and Cases

A CASE OF MIXED SALIVARY TUMOUR OF THE PALATE

By Gerard S. Irvine

A.S.J. Lieutenant Aged 30 This patient who was seen at the request of the dental officer presented with a large swelling in the soft palate mainly on the left side but extending over the midline (Fig. 1). It had been present for the past five or six years, was quite painless and the patient denied any symptoms.

The swelling which was firm and non fluctuant was about 4 cm in diameter. Clinical examination was otherwise entirely negative. X-rays of the skull and paranasal sinuses showed no abnormality apart from a calcified pineal.

He was admitted to hospital and under general anaesthesia the mass was excised. The tumour was encapsulated and shelled out easily (Fig. 2).

Histology showed this to be a mixed salivary tumour (Figs. 3 and 4).

He was referred to the radiotherapist who advised against radiotherapy unless he should get a recurrence.

He will be seen for review at intervals.

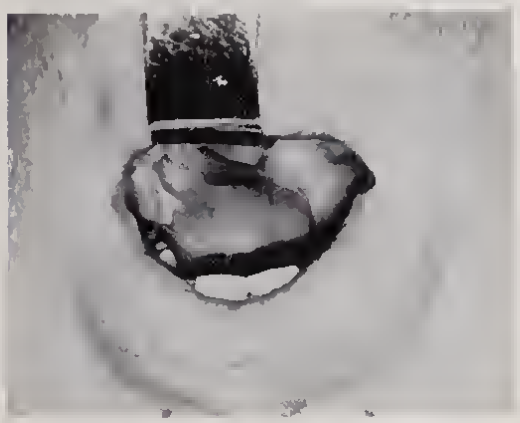
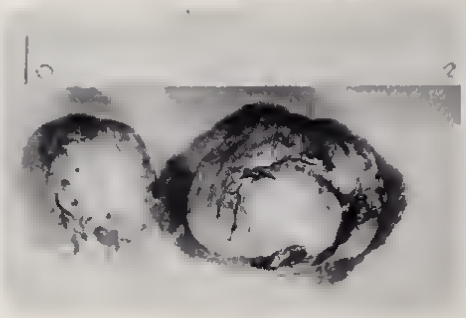


Fig. 1. *Large swelling in the soft palate*



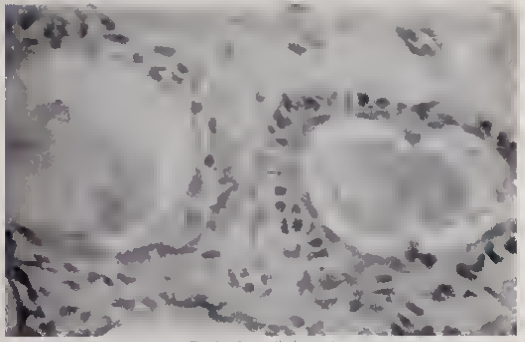


Fig 4 Sacro (high power)

ACKNOWLEDGMENT

I [illegible] Surgical Commander J D Ross for the [illegible] and Lt Cdr [illegible] Chief RN Hospital Haslar for permission to publish this

A CASE OF ERYTHEMA MULTIFORME EXUDATIVUM

(Stevens-Johnson Syndrome)

By J W. Lusk and E. J Gordon Wallace

To report an unusual case may arouse more interest in the writer than his readers The Stevens Johnson Syndrome is a rare condition of unknown etiology, which is thought to be a severe variant of erythema multiforme The latter is an eruption usually classified as 'toxic', which though self limiting is liable to relapse

The syndrome consists of

1 Inflamed and ulcerated mouth and lips

2 Acute conjunctivitis with blepharitis

3 Acute inflammation of the urinary meatus in the male and of the labia and vagina in the female

4 A rash erythemato papular with a centrifugal distribution to begin with, becoming vesicular and with the individual lesions increasing in size These may burst leaving a raw surface which becomes crusted

All these lesions are extremely painful

The disease is commonly preceded within the previous months by an upper respiratory tract infection An atypical pneumonia may be a complication (Liddle, 1951) Death is not unknown An association with treatment with sulphonamides or barbiturates is thought to exist (Beveridge Harris Wise and Stevens, 1964, quoted by Sneddon, 1965) The long acting sulphonamides are in particular suspect

Clinical History of the Case

1*st March* 1968—A young seaman aged 18 years 10 months, reported at the Sick Bay in his ship with a sore throat and cough. His temperature was normal He was treated symptomatically as an upper respiratory tract infection

4*th March*—His throat was red and inflamed and small eruptions were noted in the mouth He complained of pain in the chest He was given one million units of crystalline penicillin intramuscularly

6*th March*—His mouth was more inflamed more swollen and more painful He still had a little pain his chest His temperature was 99° and he felt weaker He was sent ashore for examination

He looked pale and ill He had angular stomatitis and the mucous membrane of his mouth and cheeks was covered with a thick glairy exudate There were two shallow ulcers on the soft palate The fauces were relatively clear He had no urethritis or conjunctivitis and clinically the chest was clear His temperature was 100·4° He was sent to the Sick Bay H M S *Ospre*)

7*th March*—He was very uncomfortable His temperature was 102° and he complained of sore eyes A few papules and blisters were seen on the upper chest and thighs.. these were about 1 cm in diameter There was slight thickening and erythema around the vesicles In spite of the centrifugal distribution of the eruption chickenpox was considered and he was sent to the Civilian Isolation Hospital

It was thought that he might have an atypical pneumonia in addition to his skin condition and he was started on chloromycetin 500 mgm. 8-hourly. Vesicle fluid and blood serum were sent for virological investigation to exclude variola.

The severity of the rash with typical [illegible] on the lids are not [illegible]

8th March—Temperature remained high and he was very ill. He now had acute conjunctivitis and irritation of the urinary meatus. The rash was also spreading.

A firm diagnosis of Stevens Johnson Syndrome was made: the chloromycetin was discontinued and prednisolone was started with a dosage of 25 mg. every six hours. After forty eight hours this was reduced to 20 mg. six-hourly, and this dosage was continued for four days when it was tapered off to 10 mg. and then 5 mg. six hourly over the next twelve days, being finally stopped on April 1. Antibiotic cover with tetracyn was maintained throughout the period of steroid treatment.

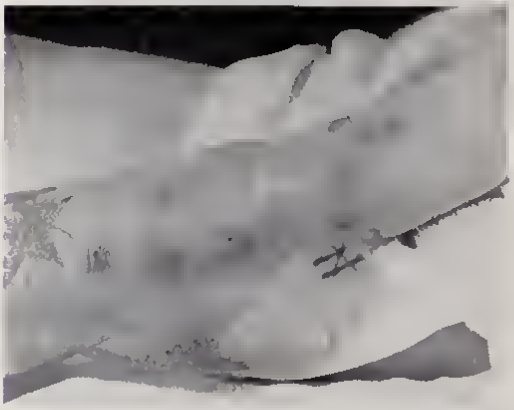
There was some improvement in the temperature after twenty four hours treatment with prednisolone though his discomfort was more slowly relieved

The rash became more profuse tending however to retain its centrifugal distribution The vesicles became larger up to 2 cm in diameter

The conjunctivitis was intense and very uncomfortable There was no corneal involvement or iritis The eyelids lips and foreskin were covered with scabs The scrotum was very tender and became an oozing bag

After a week he began to feel better and his temperature became normal after twelve days in hospital

The photographs show the features of the fully developed rash One should stress that this is not characteristic of the lesions in the early stage



The fully developed bullous rash seen on the right upper arm and elbow

Special Investigations

Repeat W B C counts showed a polymorph percentage varying between 86% 94% of a total of 9½ thousand There was a shift to the left

A chest X-Ray on March 28 showed no evidence of significant abnormality

The cultures for variola were negative

Investigation for mycoplasma by cultural methods was carried out and proved negative

Progress

The patient made a good recovery and was discharged from hospital for convalescence on April 5 1968

Previous History

This is interesting He says that he is very liable to catch colds and 'flu' We got in touch with his family doctor who said that to the best of his knowledge no long acting sulphonamide had been prescribed for the patient at any time Before he joined the Navy he had a very sore mouth which he thinks was even worse than the present attack

In March 1967 he was treated in H M S *St Vincent* for an upper respiratory tract infection and 'a rash on the forearms and legs typical of erythema multiforme also similar lesions in the mouth and lips' The treatment was routine with Caladryl for the skin

In June 1967 he had ulceration of the mouth treated with Tetrazets

In July 1967 he had ulceration of the mouth with a temperature of 99 2° He was treated with Bradosol and mouth washes of Glyco-Thymoline Early in August he was no better The white cell count was 5 700, with a normal differential count On a routine of hydrogen peroxide gargles 1 M penicillin and syrup nystatin there was a rapid recovery He was discharged on August 22 1967, sign and symptom free On September 15 1967 he reported a rash on his back trunk and arms with a normal temperature The rash responded to Caladryl

DISCUSSION

The diagnosis of this severe febrile illness was not in doubt with the full development of the rash, with the eyes like balls of fire with the lesions of the eyelids lips mouth and urinary meatus with the history of suggestive previous attacks and the onset associated with an upper respiratory tract infection

Diagnosis is difficult however in the early stages Vincent's Angina may produce a very sore mouth and Vincent's organisms may be found in the mouth in a Stevens-Johnson syndrome (Stevens and Johnson 1922) but it is a gingivitis and pyorrhoea with an easily removed exudate

Ulcerative tonsillitis and diphtheria produce lesions in the fauces which the Stevens-Johnson syndrome tends to spare (Liddle 1951)

The Rash—Again it is in the early stages that difficulty is felt Measles may be suspected if an erythemato papular rash appears first on the face and only continuing observation may make the diagnosis clear The appearance of the lesions in the mouth may help

The vesicular development of the rash on the face wrists and ankles may and often does, arouse a suspicion of smallpox or of the more harmless chickenpox

Prognosis—Relapses are to be expected and invaliding may have to be considered

Thoughts on Etiology—For those who are interested in the recent ideas on the etiology Lyell Gordon, Dick and Sommerville (1967) in an article in the Lancet, discuss various theories while investigating the possible role of mycoplasma pneumoniae

SUMMARY

A case of erythema multiforme exudativum (Stevens-Johnson Syndrome) is described.

During the early stage of the disease the rash may be confused with smallpox and in this case chickenpox was suspected.

Treatment for a self limiting disease is largely systematic and supportive. Prednisolone in adequate dosage is of great value.

Modern ideas on etiology are still indefinite but sulphonamides, or barbiturates and also viruses are suspected amongst other things, of being in some way connected with the disease.

REFERENCES

Beveridge J, Harris, M, Wise E, and Stevens L (1964) *Lancet* **ii** 523.

Liddle D C (1951) *Modern Practice in Infectious Fevers* Edited by H Stanley Banks Butterworth & Co (Publishers) London 2 948.

Lyell A, Gordon-A M, Dick, Heather M, and Sommerville R G (1967) *Lancet* **ii** 1116.

Sneddon I (1965) *Practitioner* **1155** 194 95.

Stevens A M and Johnson F C (1922) *Amer J Dis Child* **24** 526.

Articles

THE CARE OF THE INJURED IN ADVERSE CONDITIONS*

By Stanley Miles

I am very conscious that the majority of you who are listening to this paper have the advantage of caring for the injured under the very best of conditions. I deeply appreciate the honour of being invited to give this memorial lecture and propose to deal with those remote and stressful situations where the successful treatment of an injury depends solely on the resourcefulness of companions and the courage of the individual. Often indeed the injury may be the direct result of the environment: a slow progressive destruction of tissue and function which in the long run may be as equally hazardous to life as the instantaneous damage of the severe physical accident.

A study of the effects of injury in adverse conditions gives prominence to the now accepted belief that an injury involves the whole person in what Ruscoe Clarke has described as the illness of trauma. Unfortunately there is still a tendency in many quarters to isolate the injury and rarely a day passes but we see in the national press the paragraph:

He was taken to hospital where he was detained for observation. A hospital spokesman said he was suffering from shock but was otherwise uninjured.

That every wound should be considered against the background of the patient is not a new idea. In 1744 Dr. Swieten commenting on the Aphorisms of Professor Herman Boerhaave of Leyden wrote:

There are many who have their whole nervous system so very liable to irritation that the slightest cause throws them into convulsions, cramps, etc., or induces even death itself. Ought the patients death in such a case be ascribed only to the wound itself?

As an example he goes on to report:

The King of Persia playing with one of his concubines that he had a great love for, directed the point of his dagger towards her breast and while he was feigning to stab her naked breast happened to make a slight wound scarce visible to the eye and yet she suddenly fell down and expired in an instant.'

The X-ray (Fig. 1) is that of an elbow in which there is a minute crack in the olecranon process. Normally this would create little interest and treatment and recovery would be uneventful. In fact this accident aroused world wide concern and could have been disastrous. It resulted from a minor injury to a yachtsman during an epic single-handed return across the South Atlantic. News photographers were quick to point out the self-applied bandage and emphasised the discomfort which must have resulted from the inability to rest the injured limb. Even the most trivial injuries can render the single-handed adventurer far from base extremely vulnerable to his circumstances.

*Ruscoe Clarke Memorial Lecture given to the Institute of Accident Surgery at Birmingham on May 9, 1968.

[illegible]

Thus when injury occurs attention must be paid both to the individual's personal reaction and the effect of his immediate environment. In many cases as the following examples will show, the injury itself is of least importance.

The most common injuries under adverse conditions have occurred during war time but these are well recorded and will not be included in this paper.

INJURY IN A STRESSFUL ENVIRONMENT

Survival from injury where no professional help is immediately available and may not be reached for weeks or more will depend first of all on the extent of the wound and effectiveness of first aid either self applied or given by companions. If this is adequate the most important single factor in ensuring ultimate survival is morale,

the will [illegible] and [illegible] to [illegible] his response discipline and the encouragement and support of his companions. The more adverse the environmental conditions the more important this becomes especially as they too may cause further injury.

Explorers and other adventurers who must be prepared for emergencies and privation will if they are wise have studied the special hazards which may lie in wait for them. The need to travel light may well limit the first aid and medical stores carried but in addition to injuries due to environment and accidents involving sprains fractures and wounds preparation should be made for the rarer mishaps such as snake bite attacks by dangerous marine animals or other specific causes.

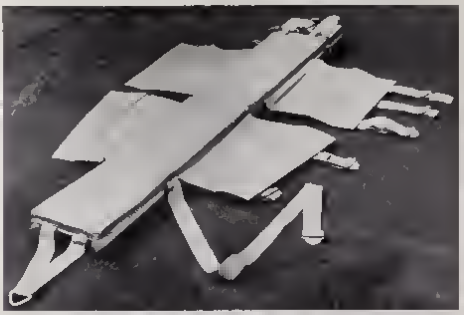
INJURY ON MOUNTAIN AND MOORLAND

The increasing popularity of mountaineering, cross country walking and moorland survival training which may be undertaken by individuals small parties or larger groups will inevitably produce a toll of injuries commonly to the legs and ankles. Such accidents invariably make it difficult or impossible for the casualty to continue. First aid treatment may be no more than firm bandaging and splinting of the injured part with the administration of a simple pain relieving drug such as aspirin. The vital decision which must be made according to circumstances is whether (a) the patient should be encouraged to struggle on with or without the help of companions or (b) whether he should be left while others attempt to find help. In rough remote country, the former may be impossible and indeed even under the more ideal conditions should only be considered if it can be accomplished without further harm or exhaustion to the injured person.

The greatest single hazard in these circumstances is that of exposure. In recent years this has produced many deaths in moorland exercises all of which need not have occurred if adequate precautions had been taken. Even in this country a person who is wet will rapidly become cold and suffer from acute hypothermia. An injured person is particularly vulnerable to this. The first consideration thus must be to provide shelter and dry clothing if available. Those engaged on such expeditions should be prepared for this by wearing not only completely waterproof outer garments but carry dry clothing in reserve. Pugh (1966) has stressed the need for providing adequate protection against wind and wetting especially for the legs. In the cooling process wind is extremely important and shelter from this can usually be provided by digging in, making shields of stone or bracken or even building a snow house and giving as much personal cover and clothing as can be arranged. In other words making the casualty as comfortable as possible. Provided the position is adequately marked companions can then leave to seek help even if only one is available. One man adventures of this kind however should be discouraged but when accidents happen to them they should know the importance of shelter until conditions improve or help arrives. It is far better to stay put than risk further shock and chill by struggling on at a very reduced rate in adverse conditions.

When rescue teams arrive they may or may not be specially trained but great care will be needed in the transport of the patient over the rough ground. For this purpose lightweight cradle or the more recent Paraguard stretchers (Fig. 2), are

ideally suited particularly the latter which can be lowered by rope over steep falls If the injured person is already suffering from hypothermia he should be rewarmed as soon as possible It is generally believed that the best method for doing this is rapid rewarming in a bath at 40 C or pouring over the clothed person water at 45°C An alternative suggestion if the patient can be adequately covered to retain warmth is to immerse the hands only in hot water



[illegible] Rescue Sled

In these conditions [illegible] protection of moorland the protection of the individual from the elements and the avoidance of exhaustion become of greater importance than the injury directly experienced and first aid has been given

INJURY IN ARCTIC REGIONS

Areas where there [illegible] ice and sub-zero temperatures in addition to the hazards of exposure mentioned above present the direct damaging effects of cold such as frost bite Under these conditions expeditions are usually well organised and it is not until the activity is slowed down by disaster or injury that problems of this nature arise Frost bitten hands and feet result from the actual freezing of tissue The pain of extreme cold is replaced by numbness, pallor and later greyish yellow discoloration becoming black Successive exposures may show by rings where skin has peeled off

If the feet are at the same time continually wet the more chronic conditions of immersion foot with a livid appearance and ulceration may develop After three or four days the feet and legs may swell, become dead white and lose sensation While every attempt should be made to prevent these conditions treatment demands

gentleness and avoidance of further injury by rubbing or pressure. Slower rewarming is the treatment of choice and often under the circumstances of the incident considerable ingenuity is required to achieve this. As a first aid measure some alleviation may be obtained from the body warmth of companions. Where cold injury has not yet developed but threatens the individual should be encouraged to wriggle the exposed fingers and toes continually with minimal periods of rest. If this can be kept up it may considerably delay the onset. Adequate treatment is frequently only possible on return to base. It is important in these and similar conditions again to treat the patient as a whole giving encouragement with warm food and drink if available and above all maintaining the will of survival. Experienced arctic adventurers have time and time again shown the value of carrying facilities to provide hot warming drinks. Sir Ernest Shackleton in his remarkable arctic adventures found the primus stove an invaluable piece of equipment.

INJURY IN THE JUNGLE

As a complete contrast the injured traveller in the jungle would run little risk from exposure, be fairly well supplied with food and water and protected by shade. Difficulty in transport of the injured would be worsened by the thickness of the undergrowth but the worst hazards would be from fever carrying and biting insects and the wild animals. Some of these might indeed be the cause of the injury and those planning such adventures would be well advised to prepare for such emergencies as for example snake bite (Morrison 1965).

A person bitten by a snake is invariably terrified in spite of the fact that the overall mortality does not exceed 2% — thus the most important requirement is reassurance. The outcome depends on several factors, e.g. the toxicity of the venom or type of snake, the amount of venom injected, the site of injection and the resistance of the victim. The toxicity and consequently the mortality varies with the species of snake. It may be a neurotoxin of cobras and kraits or a haemotoxin of vipers. The amount injected will be large in a snake fresh from hibernation which has not yet fed or small in one which has recently bitten other animals or is nearing the end of the season. The result will be much more serious if the bite penetrates a vein than if it enters loose avascular tissue. Adults are naturally less susceptible than children.

After reassurance the bitten surface should be washed with water and the part immobilised. If possible the limb should be kept in a dependent position which with complete rest will delay the absorption of the venom. Pain may be relieved with aspirin or pethedine but never morphia.

In snake country overseas a specific antivenin may be carried which should be given intravenously after first testing subcutaneously for signs of anaphylaxis. In Great Britain where the viper is the only venomous snake the specific antivenin is more dangerous than the bite. Its value is unproven.

The tempo of life in the jungle is inevitably slow and there is rarely any urgent flight against time. On the other hand a disabled man, particularly if he has open wounds, can rapidly be overwhelmed with leeches or bitten by ants or other insects. (I shall never forget finding an injured man who had lain in the jungle for several

days with open wounds which were swarming with maggots and most unpleasant to deal with) In these hot, humid climates it is only to be expected that the healing of wounds is invariably delayed and transfer to air conditioned hospitals is essential for successful recovery

INJURY IN THE DESERT

During the hot season the main danger to an injured man is the dry burning heat of the tropical sun Not only for the direct effect on any exposed skin but more so for the dehydration which is inevitable if as frequently occurs water is at all scarce Any effort on the part of the victim to move or exert himself will hasten the onset of heat stroke The water requirement in any activity during heat of the day may be as great as one litre per hour Shade is thus essential to the casualty in the desert and any attempts to move him should take place only at night when the air is relatively cool Hot sand-laden winds may frequently add to the misery of this situation

INJURY AT SEA

Injuries at sea are common Those from conventional causes are more frequently due to the motion of the ship which may throw men against obstructions or cause them to be struck by imperfectly secured objects Most of these are given simple treatment by a single handed doctor or expert first aid from the ship's master Major injuries are more common in harbour as a result of loading and stowage of cargo or repair to machinery These are taken care of by the shore based medical services

It is as a result of and following shipwreck that injuries may occur in situations fraught with danger Many may be hurt in trying to save the ship or launch life boats The act of jumping into the sea may be dangerous if bulky objects are floating about or if the life jacket worn is unsatisfactory or improperly secured When the s s *Lakonia* caught fire in 1963 many passengers jumped into the sea from a considerable height. Of bodies recovered and examined 75" showed evidence of head injury suggesting injury by the life jacket on hitting the water

The transfer of injured from a sinking ship is a chancy business and where possible they should be placed in the boats before lowering or board rafts directly In the water even when satisfactory life jackets are worn the problem of climbing into a boat or life raft may still remain Thus is sometimes difficult for the completely fit and may be impossible if a limb is out of action through injury Of many designs of ladders and boarding ramps tested none is completely satisfactory and injured men are largely dependent on their companions for assistance Fortunately seamen are compassionate men and help is rarely lacking

Both injured and uninjured men in the water are, if they escape drowning faced in arctic waters with hypothermia and exposure and in tropical waters very much at the mercy of sharks

(i) *Drowning*

There has been considerable misunderstanding about drowning which most certainly represents a form of injury in an adverse environment This is largely due

to the publicity given to animal experiments where there is a clear distinction between drowning in fresh water and sea water. Fresh water when inhaled produced gross haemodilution with rapid death from ventricular failure while sea water caused marked haemoconcentration with a slightly slower death from circulatory failure and cardiac anoxia. In man both clinically and at post mortem examination little or no difference is found.

In man possibly twenty per cent of drownings occur without water entering the lungs (*dry drowning*) and death is due to a simple asphyxia. It is these cases which respond best to resuscitative measures, have dreams of past events and make an uneventful recovery.

When water enters the lungs (*wet drowning*) irrespective of whether it is salt or fresh and especially if it contains suspended matter it will act as a foreign body producing pulmonary irritation with an exudate of protein into the alveoli. The lipid lining of the lungs which normally acts as an anti surface tension agent to maintain balanced aeration of alveoli loses its effect when diluted with water so that some alveoli collapse whilst others expand. The bulk of capillary blood flow is diverted through the collapsed alveoli thus being less vulnerable to water transfer from osmotic differences.

If the patient survives the asphyxial threat in these cases he may, unless vigorous treatment is applied, develop a progressive respiratory deterioration with increasing pain, cough, breathlessness, cyanosis, i.e., a progressive pulmonary oedema, pneumonitis, consolidation and death from what may be conveniently called *secondary drowning*.

New first aid techniques of exhaled air resuscitation and closed chest cardiac massage have greatly improved chances of survival and allowed time for drowning cases to be brought to hospital still alive. All cases, even uncomplicated dry drowning, should be admitted for at least 24 hours observation. Where there is evidence of inhalation of water, i.e. of pulmonary embarrassment or more rarely disturbance of blood electrolyte balance, the case becomes an acute medical emergency demanding such rigorous treatment as positive pressure oxygen, tracheotomy and intravenous plasma supported by antibiotics, hypothermia to diminish the effect of cerebral oedema if resuscitation has been delayed and steroid therapy.

Death may also occur as a result of sudden immersion in cold water possibly due to a vaso vagal shock. This fortunately is a rare event but when it does occur is more likely in young adults who have absorbed large quantities of alcohol.

(ii) *Hypothermia*

A lightly clothed man will not live more than fifteen minutes in water at 0°C and cannot maintain heat balance below 20°C (Hervey, 1955). The more clothing he wears the better and with a specially designed survival suit it is possible to remain alive for 6 to 12 hours. Men in the water are on their own and injuries must await attention. If they are well trained they will have been taught that unless they have a heavy covering of fat, they should remain as inactive as possible (Pugh and Edholm 1955). A thin man swimming loses a great deal more heat than when he is at rest.

(iii) *Shark Bite*

In warmer waters where the sea temperature exceeds 20°C if drowning is escaped, the next hazard in the water is not hypothermia but sharks from which death may be equally swift In this situation a wounded man is exceedingly vulnerable as blood will attract sharks from considerable distances and if present in quantity may send them into a vicious frenzy Every story of voyages in small boats or prolonged drifting on rafts records the ever present menace of hungry accompanying sharks ready to pounce upon the limb carelessly dangled in the water or quickly devour any body put over the side On one typical occasion ten men spent five days on a raft 7 ft by 4 ft in size without food or water The days were scorching hot and the nights bitterly cold and during the period one sailor cooling his legs in the water was pulled in by sharks A further seven perished from exhaustion or fell over the side while suffering from hallucinations and were devoured Finally when the last two survivors saw an approaching ship one of them tried to paddle the raft towards the rescuers with his leg. This was immediately amputated by a waiting shark He was however recovered and lived

The shark bite is commonly a massive ragged tearing away of flesh in bulk the amputation of a limb or even the bisection of the body Gross haemorrhage and shock occur for which early plasma transfusion gives the best chance of survival In the popular sub tropical bathing beaches where the shark menace exists Davies (1964) recommends the establishment of first aid posts with stocks of plasma and giving sets available for immediate use at the water s edge

Sharks, even the non biting ones may also cause injury by direct buffeting with their heavy bodies or damage large areas with broad abrasions from contact with their extremely rough skins Sharks are not man s only enemies in the sea There are barracuda, groupers giant clams equally fatal stinging coelenterates which may kill within three minutes, stone fish manta rays sea snakes and the mighty killer whales who will flip over an ice flow and devour whole any unfortunate castaways who might be taking passage on it

(iv) *Dehydration*

That the period between leaving the ship and reaching a life boat or raft is critical has been well shown by McClance Ungley, Crosfill and Widdowson (1956) They found that for 27 000 men lost at sea between 1940 and 1944 the mortality was 33% of whom 80% died in the water Once the raft or life boat is reached the chance of survival is greatly increased although a whole list of adverse factors remain, the major one of which is dehydration Without water death will occur within a week or ten days and any attempt to drink sea water even diluted with fresh will only speed the end An injured man may already be dehydrated from loss of blood and to give him an equal chance his water ration should be increased at the expense of others Usually seamen in distress will make great sacrifices for wounded companions but in desperate circumstances morale and discipline may crack and there have been instances where the wounded and dying have been sacrificed for food and drink To quote a survivor

We caught the blood in a baler and drank it while it was warm We stripped the

body cut it open and took out his liver and heart and ate the liver while it was warm' (McCormick 1964)

These acts of cannibalism, unthinkable though they may seem, have saved lives which would otherwise have been lost and theoretically there can be little real difference in a man saving his life by eating a dying man's liver than the acceptable surgical practice of a heart transplant.

The onset of dehydration may in the early stages be worsened by seasickness which should if possible be treated. Most professional seamen will have adapted themselves to the rough weather, although the rubber life raft itself, because of its flexibility, produces in bad weather a motion far worse than that of a rigid boat which at least accepts some rhythm. All life boat rations therefore should include seasick tablets of which hyocine hypobromide is the drug of choice. It is very rare, however, for seasickness to last more than 48 hours, but this period is often critical in an emergency.

(v) *Exhaustion*

The struggle to climb into the life-raft or boat in circumstances of extreme anxiety and stress may be particularly gruelling, especially if the individual is in any way injured. This is worsened by exposure to motion, cold, wet and wind, and sometimes over-crowding or even the desperate urge to survive amongst panicking companions. This with shortage of water and food and lack of sleep very soon saps away the individual's reserves until even the smallest effort is utterly exhausting. Loss of muscular control is not uncommon and it becomes difficult to maintain balance without falling overboard. Sleep is often impossible. It is well known, particularly by single-handed ocean sailors that lack of sleep quickly leads to bizarre hallucinations. These often taking the form of beckoning figures are so convincing as to cause survivors to step into the water and drown. Lindemann (1965) describes his own experience of sleeplessness and hallucination and stresses the importance of prolonged personal pre-conditioning before venturing on a long voyage so that the sub conscious is trained to ignore the temptations of any hallucinations and carry on with routine matters.

Exhaustion is further worsened by the variety of damage which may be done by exposure—for example sunburn, sunstroke and sores and boils from the irritation of sea spray. In time victims may have more of their skin covered with abscesses than without. If these are untreated they will speed the onset of death but little more can be done than cleansing with handkerchiefs dipped in sea water. If they can be kept free from pus they will be less painful.

(vi) *Loss of Morale*

Whether injured or otherwise the one single factor which can weigh the balance in favour of survival is good morale. Time and time again one experienced, confident and strong personality amongst a group of castaways will hold them together and bring them through to safety. Once the will to live is lost death soon follows. A life-boat containing 82 men was adrift for 23 days (West, 1960). Of these 19 were British, 24 Sikhs and 39 Lascars or Goanese. Only 38 survived. 13 British, 10 Sikhs and 15 Lascars or Goanese. These figures speak for themselves, reflecting the importance of

the greater experience and faith of the British seamen A good leader will allocate duties take care of the injured, keep hope alive and the men systematically engaged in some activity In the early days this may be singing and story telling but as exhaustion grows it is common and helpful to resort to prayer which may save the day and instil the necessary faith to pull through Many life boat packs planned with this in mind include both cigarettes and a copy of the new testament

If the toll of loss of life at sea is to be reduced professional sailors must be provided with the very best of life saving equipment be taught how to use it and understand fully the art of staying alive in extreme adversity

INJURY UNDER WATER

The recent extension of diving techniques is exposing more adventurers and sometimes avaricious men to a new and often dangerous environment Accidents do occur, many are fatal but gross physical injury is rare except perhaps by underwater explosion laceration from motor boat propeller blades or crushing Surfacing for treatment may be complicated by the need for decompression and any surgery required to be done may have to be carried out in the confined space of a compression chamber in which the patient may have to remain for many hours

A more specific injury may occur to a diver who is forced to abandon a faulty set on the sea bed and attempts to surface holding his breath Reduction of pressure during ascent will result in air within the chest stretching lung tissue as it expands until it becomes torn At the surface when pressure is released some air may pass through torn lung tissue directly into the pulmonary circulation and reaching the heart enter the arterial circulation as air emboli These may cause fatal infarcts in the cerebral or coronary circulation If this occurs the ideal and life saving treatment is immediate recompression to a pressure of 5 Ats absolute If no pressure chamber is available the chance of survival may be slightly improved by placing the casualty with the head low in a position between left lateral and prone in the hope that the lighter bubbles of air will be kept away from cerebral and coronary circulations

Even in the pressure chamber such cases during treatment may have escape of air through damaged lung into the pleural cavity This makes decompression and release from the chamber difficult as reduction in pressure causes this air to expand giving respiratory and cardiac embarrassment Only active withdrawal of the trapped air will relieve the condition which treatment must be carried out in the chamber under pressure

CONCLUSIONS

From the foregoing it will be seen that where injury occurs in remote and stressful conditions provided adequate first aid can be given the main task is to protect the patient from further harassment by the environment This needs not only physical protection but a strong conviction that however bad things may be the ultimate result will be favourable There is in this story a lesson which may well be of importance in treating all injuries even when the most modern facilities are immediately available An injured person finds himself in a situation where the whole of his world is turned

npside down He may be in pain bleeding snrronnded by agitated spectators and very frightened He may be whisked into hospital by an efficient ambulance service and treated skilfnlly by well trained snrgeons when the most important need from the beginning is a few words of gentle reassnrance This is a lesson I personally learned from a very distnngnished surgeon known I am snre to most of yon, the late Sir Ernest Finch However bleak the patient s future he would place his hand on his shoulder and with a voice full of compassion and conviction say, 'Don t worry yon are going to be perfectly all right'

There was something about the way this reassnrance was gven which made it the most important of all the treatment.

Finally thongh I promised not to quote wartime injuries I wonld like to sav a brief word abont the death of Lord Nelson as I think this illustrates the argnment with extreme clarity

Lord Nelson was a man of superb morale hbre and integnty whose spirit in adversity was maintained by his absolute sense of dnty and a deep and very real love for Emma Hamilton He took great care of his health and remained, as was shown eventnally by the post mortem examination extremely fit His heart resembled that of a yonth although he was 47 years old when he died At the time of his injnry he was walking with Admiral Hardy on the quarterdeck of HMS *Victory*. A ball from a mnsket struck his left epanlette, entered the shonlder slightly fracturing the acromion process of the scapnla and passing obliquely into the thorax, fracturing 2nd and 3rd ribs and entered the left lobe where it divided a large branch of the pnlmonary artery Thereafter it penetrated the left side of spine between 6th and 7th dorsal vertebrae following the left transverse process of the 6th On wonnding the spinal mednlla and fracturing the right transverse process of the 7th it made its way from the right side of the spine following this course thronph the mnscles of the back and lodged therein about 2 in below the inferior angle of the right scapulas When the ball was removed a portion of gold lace a pad of the epanlette and a small piece of the coat were clearly attached to it

The detnils of his last honrs are recorded in the official report by Dr William Beatty (1807) Ship s Snrgeon to the *Victory* in which he describes the melancholy honour' of the occasion Nelson felt the shot enter his chest and as he fell said

They have done for me at last—my back bone is shot through

This accident occnrred jnst as the battle was commencing and although Nelson was taken below he kept sending for Hardy for news of progress At other times he repeatedly reqnested those aronnd him to make snre that everything would be done after his death for the welfare of Lady Hamilton and his adopted daughter He was feeling gnshes of blood in his chest and though in great pain he sent the doctor away to care for other wounded who might be saved He refused to hand over his command to Collingwood and when the doctor told him nothing could be done for him he replied

I know it—God be praised—I have done my duty

When Hardy later reported that 14 or 15 of the enemy ships had surrendered Nelson commented

That is well, but I had bargained for 20

He pleaded that he should not be thrown overboard but taken back to England The instruction 'Kiss me Hardy' was made while he was expressing his concern for Lady Hamilton and is most likely to have been 'Kiss her for me Hardy' In spite of his gross injury Nelson by sheer force of will remained alive for 2¾ hours and died only a few minutes after the final shot in the battle had been fired

As doctors and surgeons we must never forget the great wealth of resistance which can be summoned by well-trained and resourceful minds to withstand the ravages of quite intensive injury Modern techniques frequently may make it possible to steer the injured back to health without calling upon these reserves but where the injury occurs in situations fraught with danger and out of reach of professional help, the only real hope of survival rests in the individual's will to live and that of his companions to see him through In caring for the injured in adverse conditions the most important requirement is—compassion

REFERENCES

BEATTY Wm. (1807) *Death of Lord Nelson* T Cadell & W Davies London.
DAVIES H. D (1964) *About Sharks and Shark Attack* Shuter & Shooter S Africa
HERVEY G R (1955) *The Physiology of Survival at Sea*"—Science News 38 Penguin London
MCCANCE R. A. UNGLEY C C CROSFILL J W L. and WIDDOWSON E M (1956) *The Hazards to Men in Ships Lost at Sea* H M S O London
MCCORMICK D (1964) *Blood on the Sea* Frederick Muller Ltd London
MORRISON R J G (1965) *Explorations Medicine* Edited by Edholm & Bacharach John Wright & Son Ltd. Bristol
PUGH L. G C (1966) *Brit Med J.* **1** 123
PUGH L. G C. and EDHOLM O G (1955) *Lancet* **2**, 761
SWIETEN G Van (1744) *The Commentaries upon the Aphorisms of Dr Herman Boerhaave* Vol II p 131 J & P Knapton London
WEBB F (1960) *Lifeboat Number Seven* Wm Kimber & Co Ltd., London.

BILHARZIASIS IN MAURITIUS

By Robert I Morrow

In September 1966 the Royal Naval Hospital Mauritius in conjunction with the Mauritian Medical Research Committee instigated a controlled study into the effects of Ambilhar on bilharziasis Particular emphasis was placed on the cystoscopic appearance of the bladder lesions in response to the drug and also on the side effects of the drug viz cardio-toxicity depression of bone marrow function and depression of spermatogenesis

GEOGRAPHICAL DISTRIBUTION OF BILHARZIASIS

The three species of *Schistosoma* responsible for bilharziasis are found throughout the Asian South American and African continents In East Africa and neighbouring islands (Malagasy is 1 000 miles west of Mauritius) both the *Schistosoma mansoni* and *Schistosoma haematobium* are endemic but in Mauritius only the ova of the latter have yet been identified in the urine

MODE OF INFECTION AND LIFE CYCLE OF THE PARASITE

Schistosoma haematobium which is responsible for urinary bilharziasis uses the aquatic *Bulinus* snail as a vector and the disease is contracted by washing bathing or fishing in fresh water infected with cercariae

The cercariae penetrate the intact skin of the human host and travel via the lymphatics to the lungs and the liver where they mature into adult paired schistosomes The latter then migrate via the bloodstream to the peripheral veins particularly the vesical plexus where the female lays her eggs over a period of years The eggs next pass through the walls of the hollow organs and via the urine and faeces are voided into fresh water where each ovum becomes a miracidium The miracidium invades the appropriate snail host and having passed through several larval stages emerges as the cercariae which are discharged again into the water

SYMPTOMATOLOGY

Skin penetration may give rise to pruritus known as 'Swimmers Itch', whilst the immunological response provoked by invasion of the body by cercariae and later adult worms, may manifest itself by generalised urticaria and fever Local signs are attributable to oviposition and are usually referable to the urinary tract, eg pain in loin or abdomen and haematuria or diarrhoea when the intestinal tract is involved

MORBID ANATOMY IN BLADDER

The vesical lesions are represented by

1 Nodules or 'gravel' which appear as fine white submucosal lesions and are the ova lying submucosally before penetration
2 Papillomata usually showing signs of recent bleeding which are the reaction of the mucosa to penetration These sometimes progress to malignancy
3 Ulcers and
4 Calculi

TREATMENT

Ambilhar was chosen for treatment because of its claimed advantages, viz

1 Active against all *Schistosoma*
2 Active against all stages of the parasite but particularly the adult forms, thus inhibiting oviposition which in itself would render both a clinical cure and by interrupting the life cycle of the parasite also render an epidemiological cure
3 Low toxicity, though cardiotoxicity agranulocytosis and inhibition of spermatogenesis were encountered in laboratory animals with high doses of the drug

CLINICAL MATERIAL

All doctors in Mauritius were requested to refer patients whom they considered were suffering from bilharziasis The prerequisites for inclusion in the study were

(1) Confirmation of *Schistosoma* ova in the urine
(2) No previous anti Schistosomal therapy
(3) Consent for general anaesthesia and willingness to submit to follow-up

Though the disease is endemic in Mauritius only forty-seven cases were referred from September 1966 to January 1 1968 Of these twenty six qualified for inclusion in the final analysis the remainder being dismissed under clauses (1) or (3) above The natural reluctance of the Mauritian to submit to follow-up having been cured was the chief stumbling block to the project

NATURE OF STUDY

On first admission symptomatology was recorded (Table 1) and a 16 hour urine collected The presence of ova having been confirmed in the urine Full Blood Count Marrow Smear, Sperm Count Transaminase (SGOT) and ECG were then carried out to establish a baseline Cystoscopy under general anaesthesia was next undertaken and the bladder lesions recorded Positive cases were then commenced on Ambilhar for 7 days On the eighth day of treatment the patient returned for a Full Blood Count Marrow Smear Sperm Count SGOT and ECG Thereafter at one month and three months from initial cystoscopy he was readmitted for repeat 16 hour urine specimens and cystoscopy under anaesthetic

Table I
Clinical and Aetiological Features

Case No	Age	Sex	Fever	Haematuria	Pruritus	Rash	Pain	Drinking Tap Water	Washing in Rivers
1	39	M							
2	17	F							
3	28	M							
4	15	M							
5	44	M							
6	8	M							
7	10	F							
8	13	M							
9	25	M							
10	11	M							
11	10	M							
12	16	M							
13	16	M							
14	40	F							
15	8	F							
16	22	M							
17	4	F							
18	58	F							
19	37	M							
20	10	M							
21	19	M							
22	25	M							
23	15	M							
24	21	M							
25	17	F							
26	19	F							

Cystoscopic findings are shown in Table 2. It will be seen that in all cases, both the papillomata and ulcers resolved completely, scars only remained at the site of the original lesions at second cystoscopy and complete healing had taken place by third cystoscopy. Nodules, though very much reduced in numbers were usually evident on

final cystoscopy This is not surprising as Ambilhar is most effective against the adult forms of the *Schistosome* No case of calculus was seen throughout the series

It is of interest to note with Case No 2 that further follow-up was deferred following second cystoscopy on her becoming pregnant At final review some thirteen months from commencement of treatment no bladder lesions were observed

TABLE 2
Response to Treatment—Cystoscopic Appearances

Case No	Nodules (1)	Nodules (2)	Nodules (3)	Papillomata (1)	Papillomata (2)	Papillomata (3)	Ulcers (1)	Ulcers (2)	Ulcers (3)
1	++	+	—	2		—	2	—	—
2	++	++	—	1	—	—	—	—	—
3	++	++	+	1	—	—	—	—	—
4	++	+	+	1	—	—	—	—	—
5	++	++	++	2	—	—	1	—	—
6	+	—	—	1	—	—	—	—	—
7	+	—	—	1	—	—	—	—	—
8	+ +	+	—	1	—	—	1	—	—
9	— +	+	+	1	—	—	1	—	—
10	++	++	++	2	—	—	—	—	—
11	++	++	—	1	—	—	—	—	—
12	+	+	—	1	—	—	—	—	—
13	++	+	+	2	—	—	—	—	—
14	+ +	+		3	—	—	2	—	—
15	++		—	1	—	—	—	—	—
16	++	+	+	2	—	—	—	—	—
17	+	—	—	—	—	—	—	—	—
18	— +	++	++	3	—	—	1	—	—
19	++	+	+	2	—	—	2	—	—
20	+	+	+	1	—	—	—	—	—
21	+ +	+	+	1	—	—	—	—	—
22	++	+	+	1	—	—	—	—	—
23	+ +	+	+	1	—	—	—	—	—
24	++	+	+	2	—	—	—	—	—
25	+	+	—	1	—	—	—	—	—
26	+	+	+	1	—	—	—	—	—

DRUG TOLERANCE

The 26 cases in this series were all treated with Ambilhar on the basis of 25 mg. kilogram body weight daily for seven days. The drug was apparently well tolerated.

(1) *Cardiotoxicity*

ECG and Transaminase (SGOT) were carried out on each patient prior to commencement of treatment and again after eight days. No evidence of cardiac damage was found.

(2) *Effect on Haematopoiesis*

A full blood count and marrow smear were carried out on each patient prior to commencement of treatment and again after eight days. (Following the initial four cases, marrow smears were abandoned unless indicated by the blood count.) No evidence of depression of bone marrow function was found.

(3) *Effect on Spermatogenesis*

A sperm count was carried out on each of the 13 adult male cases prior to commencement of treatment and again after eight days. No evidence of depression of spermatogenesis was found.

DRUG RESPONSE

A sixteen hour urine specimen was collected from each patient prior to commencement of treatment and a count of the ova of *Schistosoma haematobium* made. The highest count recorded in the first instance was 1106 ova/16 hours.

Further sixteen hour urines were collected on the eighth day following treatment and again at the one monthly and three monthly reviews.

No viable ova were seen in the specimens after the first month.

CONCLUSION

The study has shown that the individual treatment of vesical bilharziasis can be successful in both sexes of all age groups. Ambilhar has proved to be a safe and reliable treatment, and its duration of protection appears to be at least one year.

ACKNOWLEDGEMENT

I am most grateful to Surgeon Commander R. B. Slater, FRCS, RN, and Surgeon Lieutenant-Commander G. Lister, RN, who together initiated this project prior to their departure from Mauritius.

I would also like to thank CIBA (Ltd) of Basle, Switzerland, who kindly donated the Ambilhar and Warner & Co. Eastleigh, Hants, who donated the Transac (for SGOT estimation) used through out this clinical trial.

REFERENCE

Therapeutique Nouvelle de la Bilharziose at de l'Ambilhar. Symposium de Lisbonne 2 au 4 Juin 1965.

ASSAY OF STRONTIUM-90 IN HUMAN PERMANENT TEETH IN THE UNITED KINGDOM 1963-1965

W E. Starkey* and D L Goodridge
Royal Naval Medical School Gosport Hants England

W Fletcher and W L Brooks
United Kingdom Atomic Energy Authority Capenhurst Chester England

This report the third of the series presents further results of assays of strontium-90 in permanent teeth extracted during the years 1963-1965 It is part of a survey sponsored by the Royal Navy in conjunction with the United Kingdom Atomic Energy Authority of strontium 90 accumulating in the dental tissues of man as a result of radioactive fallout Corresponding data covering the period 1959 1962 have been reported previously (Bryant, Henderson & Holgate 1960 Starkey, Bryant & Henderson, 1964)

Material for assay is collected from all parts of the country by seventy associates The teeth must be whole and sound to preserve incremental growth patterns laid down under fluctuating conditions of nuclear contamination

Therefore, the survey is limited to premolars from persons 9-13 years old and third molars from persons aged 17-21 since these categories are occasionally extracted in perfect condition for othodontic reasons There are two collections a year (January-June, July December) Samples are hulked according to age-group Crowns and roots are divided and analysed separately Whole tooth values are derived by calculating the weighted means Teeth from areas with more than 40 inches mean annual rainfall are classified separately

The analytical methods used are those of Bryant Morgan & Spicer (1959) modified for teeth as described by Bryant *et al* (1960) and Starkey *et al* (1964) The natural strontium content is determined spectrographically by methods of Bryant *et al* (1959)

Continuous results are available respecting over 10 000 teeth The concentration of strontium 90 (estimated in pCi/g Ca) has continued to rise with the passage of time in all age groups At any given time it was higher in the younger than in the older groups In any given group it was higher in the roots than in the crowns That is to say it was always highest in the tissues that were last to calcify—an effect consistent with rising levels of dietary intake since teeth unlike bone are not subject to remodelling. Samples from heavy rainfall areas always produced higher values than corresponding samples in the general survey often more than twice as high This continued the trend noted in the previous report

The tables conform with the arrangement used in the Medical Research Council s Monitoring Series on the effects of radioactive fallout of which this work is a part

*Present address Medical Research Council Dental Research Unit The Dental School Lower Maudlin Street Bristol England

TABLE 1

DETAILS OF SAMPLES AND RESULTS OF ANALYSES OF HUMAN TEETH IN SURVEY 1963—1965 PREMOLARS

M/HT Sample reference	Date Extracted	Age Extracted	Crown		Root		Whole Tooth	
			Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca
218— 219	Spring 63	9	240	0 96	250	1 4	240	1 05
220— 221		10	250	0 77*	290	1 2	260	0 88
222— 223		11	270	0 59	270	1 0	280	0 70
224— 225		12	270	0 40*	260	0 95*	270	0 55
226— 227		13	290	0 31*	290	0 94*	290	0 48
246— 247	Autumn 63	9	290	0 92	270	1 4	290	1 06
248— 249		10	300	0 69	260	1 2	290	0 81
250— 251		11	280	0 53	270	0 96*	280	0 64
252— 253		12	270	0 40*	270	1 13	270	0 60
254— 255		13	280	0 37*	290	1 14	280	0 59
280— 281	Spring 64	9	300	1 7	220	3 9	290	2 1
282— 283		10	240	1 15	210	1 9	230	1 3
284— 285		11	250	0 83	220	1 6	240	1 05
286— 287		12	270	0 77	280	1 5	270	0 95
288— 289		13	300	0 55	260	1 4	290	0 78
311— 312	Autumn 64	9	270	1 1	250	2 3	270	1 3
313— 314		10	250	0 93	240	1 7	250	1 1
315— 316		11	260	0 82	240	1 8	260	1 05
317— 318		12	310	0 55	300	1 4	310	1 0
319— 320		13	260	0 55	250	1 4	260	0 80
346— 347	Spring 65	9	290	1 4	270	3 1	290	1 8
348— 349		10	280	1 3	280	2 6	280	1 6
350— 351		11	280	0 95	240	2 2	270	1 3
352— 353		12	270	0 86	240	1 8	270	1 1
354— 355		13	270	0 67	250	1 6	270	0 94
384— 385	Autumn 65	9	280	1 5	250	3 5	270	1 9
386— 387		10	260	1 2	240	2 6	260	1 6
388— 389		11	270	1 2	260	2 6	270	1 5
390— 391		12	280	0 88	270	2 0	280	1 2
392— 393		13	290	0 79	270	1 9	280	1 1

*Determined by yttrium 90 counting

TABLE II

DETAILS OF SAMPLES AND RESULTS OF HUMAN TEETH RN SURVEY 1963—1965 THIRD MOLARS

M/HT Sample Reference	Date Extracted	Age Extracted	Crown		Root		Whole Tooth	
			Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca
236— 237	Spring 63	17	300	0 57	370	1 0	310	0 66
238— 239	"	18	270	0 37	280	0 95	270	0 52
240— 241	"	19	290	0 47	320	0 98	300	0 60
242— 243	"	20	270	0 24	280	1 0	270	0 46
244— 245	"	21-22	280	0 14	320	0 71	290	0 30
256— 257	Autumn 63	17	300	0 66	290	2 0*	300	0 98
258— 259	"	18	240	0 44	240	1 07*	240	0 60
260— 261	"	19	250	0 45	250	1 22*	260	0 66
262— 263	"	20	300	0 23	270	0 81	290	0 39
264— 265	"	21-22	280	0 20	300	0 96	280	0 38
290— 291	Spring 64	17	300	1 0	320	2 1	300	1 25
292— 293	"	18	280	0 58	250	1 65	270	0 83
294— 295	"	19	240	0 58	280	1 4	280	0 82
296— 297	"	20	250	0 4	250	1 2	250	0 60
298— 299	"	21-22	260	0 29	250	1 1	260	0 51
321— 322	Autumn 64	17	240	0 84	260	1 9	240	1 1
323— 324	"	18	260	0 55	250	1 6	260	0 87
325— 326	"	19	250	0 38	250	1 2	250	0 62
327— 328	"	20	250	0 8	250	1 2	250	0 94
329— 330	"	21 22	270	0 32	280	1 5	270	0 66
356— 357	Spring 65	17	260	0 85	270	2 1	260	1 1
358— 359	"	18	280	0 78	290	2 1	280	1 1
360— 361	"	19	280	0 67	250	1 7	270	0 96
362— 363	"	20	280	0 53	280	1 4	280	0 80
364— 365	"	21 22	260	0 42	240	1 4	250	0 68
402— 403	Autumn 65	17	270	0-81	280	2 1	280	1 2
404— 405	"	18	260	0 93	240	2 5	250	1 4
406— 407	"	19	300	0 65	270	1 8	290	1 0
408— 409	"	20	260	0 57	270	**	270	**
410— 411	"	21 22	260	0 46	250	1 5	260	0 78

*Determined by yttrium-90 counting

**Sample lost during analysis

TABLE III

DETAILS OF SAMPLES AND RESULTS OF ANALYSES OF HUMAN TEETH FROM AREAS WITH MORE THAN 40 INCHES MEAN ANNUAL RAINFALL

PREMOLARS

M/HT Sample Reference	Date Extracted	Age Extracted	Crown		Root		Whole Tooth	
			Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca
228— 229	Spring 63	10	330	0 8	370	—	340	—
230— 231	"	11	270	0 58	250	1 2	260	0 76
232— 233	"	12	270	0 51	290	1 2	280	0 72
234— 235	"	13	250	0 36	250	1 0	250	0 52
266— 267	Autumn 63	9	260	1 8	260	—	260	—
268— 269	"	10	250	1 5	260	2 5	250	1 7
270— 271	"	11	280	1 1	280	2 6	280	1 4
272— 273	"	12	270	0 63	260	2 5	270	1 1
274— 275	"	13	280	0 62	270	2 1	280	1 0
300— 301	Spring 64	10	230	2 1	220	5 4	230	2 8
302— 303	"	11	270	1 8	230	3 5	260	2 2
304— 305	"	12	270	0 97	260	2 3	270	1 3
306— 307	"	13	230	0 59	240	1 9	230	1 2
331— 332	Autumn 64	10	—	2 5	—	—	280	—
333— 334	"	11	250	1 4	250	2 6	250	1 7
335— 336	"	12	280	0 3	240	1 3	270	0 6
337— 338	"	13	220	1 8	220	4 2	220	2 5
366— 367	Spring 65	10	290	1 8	300	4 5	290	2 5
368— 369	"	11	250	1 4	270	3 2	250	1 9
370— 371	"	12	250	1 4	240	Lost in analysis	—	—
372— 373	"	13	250	1 0	250	2 5	250	1 4
394— 395	Autumn 65	10	240	2 1	270	3 8	260	2 6
396— 397	"	11	220	1 2	220	2 7	220	1 7
398— 399	"	12	280	1 2	260	2 7	270	1 7
400— 401	"	13	290	1 3	280	3 4	270	2 0

M/HT 266 Because of the small weight of sample the standard deviation was too large for a meaningful result to be quoted

M/HT 229 Insufficient sample for analysis

M/HT 331 Insufficient sample for analysis Because of this natural strontium was determined on the whole tooth sample only

M/HT 370 Lost in analysis

TABLE IV

DETAILS OF SAMPLES AND RESULTS OF ANALYSES OF HUMAN TEETH FROM AREAS WITH MORE THAN 40 INCHES MEAN ANNUAL RAINFALL — THIRD MOLARS

M/HT Sample Reference	Date Extracted	Age Extracted	Crown		Root		Whole Tooth	
			Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca	Sr μg/g Ca	^{90}Sr pCi/g Ca
276— 277	Autumn 63	21-22	290	0 56	290	2 6	290	1 1
308— 309	Spring 64	21-22	270	0 76	200	2 2	250	1 1
339— 340	Autumn 64	18	—	2 1	—	3 8	210	2 5
341— 342	—	19	—	1 8	—	4 7	240	2 5
343— 344	—	20	—	0 9	—	2 3	260	1 2
374— 375	Spring 65	17	280	1 2	270	2 7	280	1 5
376— 377	—	18	—	1 1	—	2 7	300	1 5
378— 379	—	18	—	0 6	—	2 5	270	1 1
380— 381	—	20	—	0 6	—	2 2	270	1 0
382— 383	—	21	—	0 5	—	2 6	270	1 0

M/HT 339/340 341/342 343/344 Because of small sample weight, natural strontium was determined on the whole tooth sample only

M/HT 308 Because of small sample weight the error on the natural strontium result may be ± 25%

ACKNOWLEDGMENTS

The authors are deeply conscious that the investigation starts with those colleagues responsible for sampling and classifying the material used for analysis. The accuracy and care with which this stage of the procedure is carried out is evident from the way the results have fallen into place. It is regretted that space does not permit individual acknowledgment.

REFERENCES

Bryant F J Henderson E H and Holgate W (1960) *Brit dent J* **108** 291 294
Bryant F J Morgan A and Speer G S (1959) (*The determination of radiostrontium in biological materials* AERE-R 3030 H M S O London
Medical Research Council (1960 1966) *Monitoring Series Nos 1 13 H M S O London*
Starkey W E Bryant F J and Henderson E H (1964) *Int dent J* **14** 206 225

PROTECTION OF THE PUBLIC IN RELATION TO USE OF RADIOACTIVE MATERIALS*

By C. O le C. Hughes

A complete description of *all* Ministry of Defence (Naval) activities in this context is impossible in the circumstances Apart from the natural inhibition imposed on what is traditionally the 'Silent Service' security considerations have to be taken into account

What is proposed in this short review of measures taken to protect the general public by the Navy Department is first an explanation of the general relationship of the Department to other Government Departments with Statutory powers and second the general organisation for radiation safety Later some specific problems will be described together with the means by which the necessary control is imposed to solve them should any particular incidents or accidents occur

Regulations

As a Government Department the MOD(N) finds itself exempt from many of the Statutory Instruments at present in force This applies in particular to the Navy's major nuclear activities connected with the design construction operation and refitting of nuclear propelled vessels — at the present time only submarines

The three Acts under which regulations applicable in the civil field have been made are the Factories Act the Radioactive Substances Act and the Nuclear Installation Act

The first of these provides in factories control of the use of sealed sources and unsealed substances There are quite a few establishments deemed to be factories under this Act for instance all Naval Dockyards in the UK all Aircraft Repair Yards and parts of some establishments where activities such as luminising are carried out The regulations made under the Factories Act are statutorily enforcible by the Ministry of Labour in these establishments for conventional non destructive testing radiography storage of sources etc. However where the major potential hazards exist — in our Nuclear Dockyards — the Sealed Sources Regulations have not so far applied to processes covered by the original Ministry of Power Act i e processes for the production of power by fission or processes ancillary to that work* Therefore in the Naval and Contractors Yards where nuclear submarines are built and refitted the Ministry of Labour Regulations for Sealed Sources are not statutorily enforceable for work on reactor systems although they are for all other processes Regulations under the Factories Act to cover work involving exposure to neutrons or unsealed radioactive substances have only this year been introduced and the implications of this are still under discussion

*At the time this article was read as a paper at a meeting of the Society for Radiological Protection at the Middlesex Hospital on October 10, 1967 this statement was true Since then the Department of Employment and Productivity (late Ministry of Labour) has produced the Ionising Radiations (Sealed Sources) Regulations 1968 and the Ionising Radiations (Unsealed Substances) Regulations 1968 coming into force on November 15 1968 Both of these Statutory Instruments are enforceable by that Department in areas previously exempt or not covered Although the implications of these new Regulations are still under discussion the statement that the Ministry of Labour Regulations are not statutorily enforceable for work on reactor systems will now no longer be true with respect to such work ie the Contractors Yards and H M Dockyards in the U K

The Radioactive Substances Act which plays a major part in the control of waste disposal — a real potential source of hazard to the general public — contains a clause exempting the Crown from its provisions. But the Ministry of Defence (Naval) has signified its intention of playing the game as prescribed and in fact although not required to by law all Naval establishments report through Headquarters their holdings of radioactive substances and when the question of disposal arises seek the agreement of the Ministry of Housing and Local Government to their proposals as if they were applying for an authorisation.

As far as the Ministry of Power's Act is concerned here again there is no requirement for the Navy to seek approval and be licensed as far as any of our reactors are concerned. Reactors for propulsion are specifically excluded from the Act and there is in addition a Crown exemption from the need to obtain a licence. Thus there is no statutory control that can be exercised by the Ministry of Power over either our seaborne reactors (1 built or contracted for — or our land based reactors of which we have two.

For the transport and packaging of radioactive materials it can be safely said that the Navy is under its own instructions (Defence Council Instructions (Royal Navy) 405/1968) completely in step with the present civilian regulations having in 1965 adopted the International Atomic Energy Agency agreed procedures for packaging, labelling etc.

This generally confused situation was first brought to light in 1960 when the Ministry of Labour regulations were in draft and after the publication in 1959 of the first Ministry of Power Act. The Minister of Defence (Naval) was then forced to act *in statu Ministerio* on behalf of a number of Ministers and issue his own Regulations. The first of these on the general lines of a Ministry of Power Site Licence was issued in respect of the contractors building yard at Barrow and was called the Special Admiralty Site Regulations for Radiological Protection at Barrow in Furness.

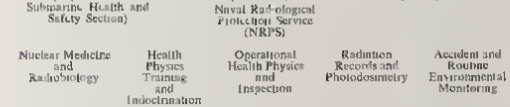
Because of the anomalous situation similar licences were issued to cover work on the Dounreay Submarine Prototype at the Admiralty Reactor Test Establishment the Naval Dockyards at Rosyth and Chatham for the contractors' yard at Birkenhead and for the Jason Reactor at Greenwich College.

In 1964 the situation in the Navy Department as a whole was regularised by the issue of a DCI(RN) — one of the longest ever produced — which was in fact the first ever UK set of regulations for radiological protection which covered every aspect in one document. This was amended in 1965 to bring the transport and packaging sections right up to date and this year has been reissued with additional provisions to cover the medical and dental uses of ionising radiations.

Admiralty Organisation

Immediately after the Second World War the armed forces were preoccupied in the field of radiological protection with the problems that could arise in the event of nuclear warfare. In the Navy this situation continued well into the 1950s until the nuclear submarine programme got under way. In 1959 specifically for the submarine project a Safety Officer Nuclear Propulsion was appointed to deal

with these special health physics problems However, it wasn't until 1963, after the impact of the new Statutory Acts and Regulations that the Admiralty Board began to set up the present organisation The following chart of responsibility which now exists indicates generally the way in which the Admiralty Board discharges its responsibilities



MAJOR PROBLEMS

Generally speaking the only processes under Naval control which could potentially cause a hazard to the general public are associated with the nuclear submarine programme An added complication in the Navy's task for protecting the general public is that the reactor system the Pressurised Water Reactor (PWR) used in the submarines is unique in this country although a lot of experience has been gained from its use in the United States

There are in the main two problems of public protection which arise in connexion with the PWR system and these are related on the one hand to the major accidents which could involve release of radioactivity beyond the boundaries of a given site and on the other to primary coolant and other waste disposal

1 *Protection of the Public* The choice of building yards (Barrow and Birkenhead) depended not only on conventional reactor siting criteria but also on such matters as the expertise of contractors in the construction of submarines as vessels Thus it is that the chosen yards are apparently very close to major centres of population a situation which — at the time of choice — could not arise in connexion with the siting of civil power reactors which have a higher power rating and are not mobile Protection of the public in these situations and at berths in populated British ports anywhere in the world is dealt with under a common policy which to a great extent is in line with the general UK policy for reactor siting

Thus, while the submarine is in a building yard (Barrow or Birkenhead) and close to heavily populated areas only construction and testing is carried out No maintenance refitting or core changes are carried out there Restrictions are applied to the core inventory for radioactive iodine during reactor testing so that should a Maximum Credible Accident (MCA) occur the release of radio iodine will be the minimum compatible with the current Medical Research Council recommendations Furthermore measures are being taken now by installing water sprays and some sort of shed like containment overall with a suitable air filtration system to reduce the potential hazard even further than has been acceptable for the last six years

At the Naval Nuclear Dockyards (Rosyth and Chatham) and at the two nuclear submarine operating bases (Holy Loch and Gareloch) the situation is much less restrictive as the separation distances from the local population are much more favourable

At all berths in populated areas approved for use by operating nuclear submarines there is an exclusion distance of at least 600 yards from locally domiciled members of the general public

In common with the practices of the United Kingdom Atomic Energy Authority and the Central Electricity Generating Board a Local Liaison Committee under the Chairmanship of the Naval Commander in Chief in whose area the site happens to be has been established on the Clyde (for Holy Loch and Gareloch) at Rosyth Chatham Barrow in Furness and Birkenhead The representation is standard The functions are in general the same aimed at the primary purpose of assuring the public of the safety of the system and ensuring that if a MCA should occur, responsibilities for appropriate actions are clearly delegated and understood

Having outlined the first major problem in which the Naval reactor programme is concerned with protecting the general public, it is now necessary to describe the second — or only other — one This is radioactive waste disposal

2 *Waste Disposal* To start with it must be realised that the Pressurised Water Reactor is like no other system in general use in the UK for power production It is really a closed system while operating — there is for instance no continuous leakage of large volumes of coolant e g tons of carbon dioxide per day as in the case of the gas cooled reactors and no continuous discharge of Argon[41] as occurs with air cooling of reactors Thus there is no requirement for continuous monitoring on the scale adopted by the UKAEA or CEGB for activity released to the atmosphere

There are in effect only two sources of radioactive waste

a primary coolant which circulates through the core and

b the health physics laboratory on board

Of these the primary coolant is the only source of waste which might on a very few occasions be detected in significant quantities

In normal circumstances radioactivity arises in the primary coolant from three separate mechanisms as a result of its repeated passage through the core where neutron activation occurs:

(i) by the production of Argon[41]

(ii) by the generation of the fission product isotopes from minimal contamination by fissile material of the surface of the fuel elements

(iii) by the activation of the products of normal corrosion occurring in the metal piping system

Amounts of radioactive Argon arising are very small It is released at rare intervals when the system is degassed — at the most twice a year Compared with amounts of Argon[41] released continuously by air cooled reactors the PWR gives rise to wholly insignificant amounts Further, the releases which do occur

are made deliberately and only take place at the operating bases, and both of them are significantly far away from large centres of population. This waste poses no problem as far as the general public is concerned.

The second source of radioactivity in coolant gives rise in the course of time to extremely low levels of fission product contamination of the primary coolant. Suffice it to say that under normal operation these amounts are overshadowed by the activated corrosion product activity which itself is very low. Under conditions which could give rise to high levels of fission product activity — even a very small breach of the fuel element canning — it is enough to say that this activity is contained within the circuit and discharged later in a manner agreed to be safe by all the competent authorities.

The third source of activity is the normal process of corrosion which occurs in any metallic piping system. As this corrosion occurs the insoluble particulates are circulated through the core where neutron activation occurs. The radioactivity formed is naturally associated with elements in the alloy from which the circuit and its various components are made, those occurring most frequently being certain of the isotopes of Cobalt, Manganese and Iron.

These corrosion products appear as free particulates circulating in the system or plated inside the pipework and also in the ion exchange resin which is used to assist in maintaining the coolant at a correct pH.

A hazard to the general public can only arise therefore when this coolant is discharged to the environment. Current arrangements are for this usually to occur direct to shore installations for treatment prior to final disposal of very low level active liquid to the environment. In certain cases discharges are made to special tanks in tenders to the submarines when if shore disposal is not feasible the liquid is taken far out to sea for final discharge.

MEASURES TO DEAL WITH THE POTENTIAL HAZARDS

The Major Accident

The measures now planned are in general the same as those existing at the major Atomic Energy Authority and Central Electricity Generating Board sites. Thus each of the bases and dockyards has its own accident monitoring organisation and special monitoring team equipped to determine whether a release has occurred, gauge the size of the release, its distribution etc. and by repeated surveys provide data by which the naval and local civil authorities take their preplanned action. There has for instance been such a team at Dunoon since 1962 to cover the Holy Loch. These teams are provided by the Navy with a naval officer in charge of a number of ratings all trained for accident monitoring with specific reference to monitoring for the radioisotopes of Iodine.

In addition to the teams permanently at the main operational bases and the Naval 'Nuclear' Dockyards we also have a central accident monitoring organisation known as the Naval Emergency Monitoring Organisation (NEMO) now a part of

the Naval Radiological Protection Service (NRPS) with its headquarters in the Royal Naval Medical School at Alverstoke.

The expertise available can be deployed, as may be required, to any part of the world under the control of the Navy Department Headquarters.

Waste Disposal From Nuclear Propulsion Units

Gaseous radioactive waste poses no problem. There is no potential hazard to the general public. The amounts are insignificant and as an inert noble gas Argon is in any case not metabolised.

Solid radioactive waste is very small both in volume and in specific activity. Nearly all of it arises from radiochemical procedures carried out in the health physics laboratories on board the submarines. Rarely it is bagged up, weighted and dumped in deep ocean (in 1 000 fathoms or more) but more often retained on board and passed to a shore facility for conventional disposal by agreement with the appropriate authorities.

Liquid radioactive effluent is usually piped ashore or to tanks in a tender. If to shore the naval facilities for waste treatment render it harmless. If piped to a tender it is dumped at sea again far from land in deep water and away from any known fishing area. Only infrequently is it permissible to dump coolant direct to the marine environment inshore. This latter course is never taken with radioactively contaminated resin.

To safeguard the public's interests the Navy (through the NRPS) operates an environmental surveillance programme by the collection of mud or bottom sediment and of marine biological samples. These are all measured by low background scintillation gamma spectrometry at the NRPS Laboratories. In addition regular surveys of the beaches in the vicinity of bases and dockyards are carried out using portable instruments accurate in the lower ranges.

All this work is carried out with the full knowledge and agreement of the Ministry of Agriculture Fisheries and Food, the Ministry of Housing and Local Government and the Scottish Department, who receive copies of the results obtained. All areas are monitored before they become operational. In every instance a detailed radio ecological investigation is made in the area in order to establish any likely food webs. So far with much experience there is no evidence that dietary contamination is in any way involved in producing a potential public hazard.

Minor Problems

Outside the nuclear propulsion field the Navy's problems are small and of little import as far as the Navy Department's public protection programme is concerned. As already explained the Navy Department agrees and complies with the general provisions of existing Acts and Regulations. The greatest source of personal exposure to ionising radiation is industrial radiography with luminising and the use of luminised articles a poor second. Neither of these poses any problems of public protection.

Measures to Control

It is the Navy's policy to integrate, through the Naval Radiological Protection Service, all the services required of a proper radiological protection organisation under one umbrella. Thus through this Service the following are effected

a. Health physics surveillance of planned design and procedures (the cheapest road to safety is to incorporate safety in design)
b. Training of operators (competent persons etc.)
c. Continued surveillance and education of competent persons and others in the field of health physics
d. Centralised photodosimetry service (for the Navy and RAF) and central radiation records (this of course provides a further means of surveillance of those out in the field)
e. Surveys of working and general environment
f. Official inspections as the Navy's nuclear inspectorate

These are the direct operational tasks. But they are complemented by additional responsibilities for overseeing the introduction of radioisotopes into clinical use and for research, for development and research in health physics techniques and procedures, and for co-operation and co-ordination with other authorities in the UK and elsewhere in the Navy's interest.

THE RED CELL AS AN INDICATOR OF THERMAL DAMAGE*

By Stella Baar

Although the human red cell is highly specialised it can nevertheless be considered as a useful indicator of thermal damage. Its specialisation in the adult form has led to a preferential loss of aerobic glycolysis so that according to de Loecker and Prankerd (1961) over 90 per cent of the cell's glucose is degraded via the Embden-Meyerhof pathway. Such cells therefore isolate the effect of heat on the utilisation of energy rich compounds from that on the re-synthesis of the latter. Ready availability of the raw material offers an added advantage.

The greater part of the energy made available in the human erythrocyte by glycolysis is utilised to transport potassium against a concentration gradient. This function is closely associated with the membrane adenosine triphosphatase as has been shown by Post *et al* (1960) and requires adenosine triphosphate (Whitham 1958). Any changes in the membrane constitution would therefore be likely to affect the potassium movement. Ponder (1949, 1950) has investigated the discsphere transformation and also made a quantitative study of fragmentation consequent upon the heat damage of red cells. Such cells have also lost their normal plasticity as was shown by Teitel (1965). The latter could be caused by changes in the orderly arrangement of water molecules associated with the membrane proteins — (Nemethy and Scheraga 1962) which is essential for the normal function of enzymes.

Kinetic considerations would suggest that heat exposure would lead to a temporary increase in the activity of some or all the enzyme systems involved in the anaerobic breakdown of glucose which is also closely linked with the cell's ATP content. It was therefore hoped that cell hydration, potassium movement, activities of hexokinase and glucose 6 phosphate dehydrogenase and the pattern of glucose consumption and ATP levels would show changes. A summary of such studies which have been reported in detail elsewhere are presented below.

Materials

Venous blood from haematologically normal individuals was collected without stasis into Li heparin — solid 0·1mg/ml. All samples were put into ice water immediately after collection. Large pools of either Group O or Group A blood from at least five individuals were prepared and the "buffy" coat removed.

Methods

A. The Heating of Whole Blood

Pooled samples were distributed in 2 ml. amounts into Bijou bottles and

* The subject matter of this paper was presented at a Symposium on Research in Burns at the Royal Naval Hospital, Haslar in October 1966.

heated for 20 minutes in a water bath at the desired temperature. To arrest the action of heat the samples were immersed into water at 20°C

B The Determination of Red Cell Water

The method employed was a slight modification of the Karl Fischer method adapted by Pryce (1963) to the determination of water in biological fluids

The cell water was calculated from separate determinations of whole blood water plasma water and the packed cell volume The latter was determined on the Hawksley Micro Haematocrit centrifuge No corrections were made for trapped plasma The method used gave a mean red cell water concentration of 69·00% ±3·30

C The Measurement of Potassium Flux

Whole blood was labelled before heating with 10μC ^{42}K in isotonic carrier solution (Amersham) for each 10ml of blood used and the concentration of the isotope was determined in the supernatant plasma in a well type liquid sample scintillation counter Whole blood and plasma potassium concentrations were determined with an EEL flame photometer These values and the packed cell volume estimates were used to calculate the extra — and intracellular specific activities of potassium

D The Determination of Glucose

Glucose was determined by a glucose oxidase method subsequent to the deproteinisation with zinc sulphate and sodium hydroxide Accepting equal partition of cell and plasma glucose the cellular glucose was calculated from the whole blood values and the packed cell volumes and finally expressed as μ moles glucose utilised per cell per ml per hour — the latter being calculated from the observed 20 minutes value

E Hexokinase Activity

Hexokinase catalyses the transfer of the terminal phosphate group of ATP to glucose in the presence of Mg ions resulting in the formation of glucose-6-phosphate This reaction was measured by the determination of the residual substrate glucose At the desired time any hexokinase still present was inactivated by the formation of an EDTA Mg complex The method used was based on the one described by Sols (1956) for hexokinase activity determination in intestinal mucosa The enzyme activity after heating was expressed with reference to that of the control specimen kept at 37°C

F The Determination of ATP in Whole Blood

ATP is only present in the cells. The cellular values were therefore obtained by calculation from the whole blood findings and the packed cell volumes

The adenine trinucleotide was assessed enzymatically by a sequence of two reactions in which initially 3 phosphoglycerate is phosphorylated by ATP in the presence of phosphoglycerate kinase and Mg ions The 1,3 diphosphoglycerate is then reduced in the presence of NADH ATP and glyceraldehyde phosphate dehydrogenase to glyceraldehyde 3-phosphate Hence NADH is oxidised to NAD and any change in the ATP concentration originally present is quantitatively indicated by a decrease in NADH concentration

The method used in this study was essentially that described by Beyer *et al* (1946)

RESULTS

Whole blood was heated for 20 minutes at temperatures ranging from 37°C to 55 C As shown in Figure 1 a slight increase in cell hydration occurred already at 40°C This rate of increase in hydration was maintained up to 45°C but was almost doubled between 45°C and 50°C Higher temperatures apparently decreased cell hydration This was probably due to the destruction of the most heat sensitive group of cells

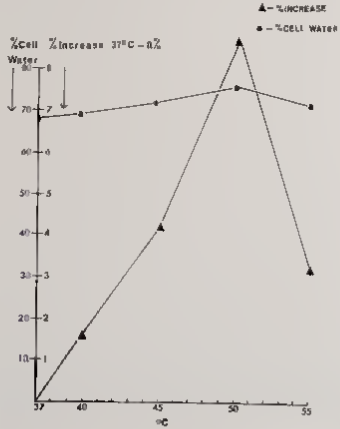


Figure 1 Changes in red cell hydration caused by heating whole blood Expressed as % cell water and change from the 37°C value

As suggested above changes in hydration could be expected to affect the red cell's potassium transport in which membrane located enzymes participate

Figure 2 shows the mean values of five separate experiments in which the active transport rate of potassium ions was measured It is evident that temperatures compatible with life scarcely increase potassium transport Between 45°C and 48°C the transport rate was almost doubled Above that temperature the increase was not so pronounced Nevertheless raising the temperature of the blood from 40°C to 50 C caused a 2.5 fold increase in active potassium transport

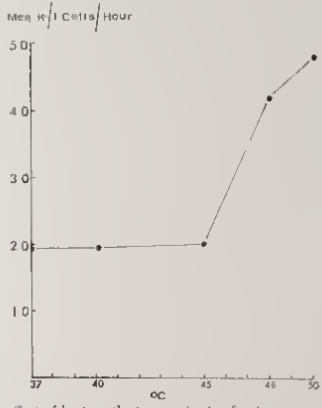


Figure 2 The effect of heat on the transport rate of potassium in red cells Cells pre-heated at temp = t and incubated at 37 C for four hours

Such changes in potassium transport must be reflected in the rate of glycolysis since 90 per cent of the red cell's energy is utilised for this purpose

Figure 3 shows the mean values of six separate experiments While potassium transport was little affected by temperatures below 45°C glucose utilisation increased linearly from 37° to 45 Above that temperature the glucose breakdown was very slightly decreased Nevertheless glycolysis increased between 40°C and 50 C about 2.5 fold — an increase comparable to that observed for the potassium transport

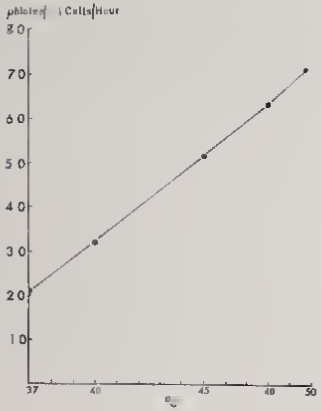


Figure 3 Glucose consumption of red cells heated in their own plasma. Expressed in μmoles/ml cells/hour and calculated from the 20 minutes values

The increase in glucose utilisation necessitates increased hexokinase activity. The results of this investigation are shown in Figure 4 in relation to the enzyme's activity at 37°C. Somewhat surprisingly the activity increase far exceeded the requirements necessary for the increased glucose utilisation. Between 37°C and 45°C a 2.5 fold increase was observed. Heating between 45°C and 48°C almost trebles this. Above that temperature there was some evidence of enzyme inactivation.

Both the hexokinase reaction and potassium transport require the energy released by the hydrolysis of an energy rich bond of adenosine triphosphate.

Figure 5 shows the pattern in red cell ATP levels obtained after heating. The slight increase between 37°C and 40°C is of interest. Above that temperature the levels fall but up to 48°C this decrease in level does not appear to have kept pace with the requirements suggested by the increased glucose consumption and potassium transport.

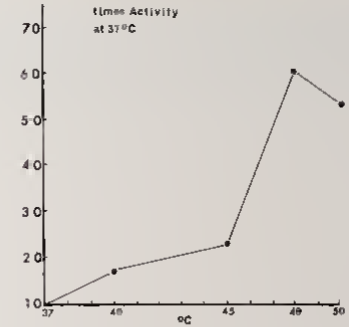


Figure 4 Changes in hexokinase activity at the end of 20 minutes heating at temperature = t

Figure 5 Percentage changes in cellular ATP levels at the end of 20 minutes heating at temperature = t

DISCUSSION

It has been shown above that heating caused a slight but nevertheless significant increase in cell hydration. Baar (1967) has fractionated the cell population after heating to 50 C into age groups and shown that the hydration of the oldest cells increased by 21 per cent compared with an about 5 per cent increase in approximately 30 per cent of all cells. The latter is no doubt the important factor since these cells will survive for about two months in the circulation. The increase in cell hydration will be accompanied by a gain in cellular sodium and a corresponding loss in cell potassium. This change in cation partition leads to a stimulation of the sodium and potassium sensitive adenosine triphosphatase (Whittam 1962) and hence to the premature exhaustion of the red cell's ATP reserves and accelerated cell death.

Active transport of potassium was shown to be little disturbed up to 45°C but significantly increased at 48° C — a temperature which corresponds to a sharp increase in cell hydration and a significant increase in extracellular potassium (Baar 1968), which clearly indicated increased efflux. Maizels (1960) suggested that the normal potassium efflux was twice as fast as the influx. Under normal conditions a steady state is maintained while under heat stress twice as much potassium appeared in the plasma at 48°C than was removed from it.

Cellular adenosine triphosphatase consists of an ouabain sensitive and insensitive component. Baar (1968) on the basis of the results of experiments in the presence or absence of ouabain suggests that heat initially stimulates both forms of the enzyme while higher temperatures only inactivated the sensitive component leading therefore to an enzyme pattern comparable to that of red cells in hereditary spherocytosis (Nakao *et al* 1967).

The increase in glucose utilisation exceeds in magnitude the energy which would be required to cope with the increase in the active potassium transport.

As has been discussed above the observed cellular specific activity of potassium comprises at least two components and any measure of changes in specific activity is only the resultant composite picture which can also be obtained by correctly balanced several fold increases in the components involved.

The sixfold increase in hexokinase activity although more than adequate for glucose utilisation is somewhat surprising since this enzyme because of its normal low activity has been considered to be rate limiting. Such limiting activity may be due to the presence of inhibitory substances as has been suggested by Christensen *et al* (1949) or activation of iso enzymes of red cell hexokinase.

The decrease in cellular adenosine triphosphate levels is not surprising because of the hyperactivity of all systems requiring energy. Somewhat unexpected was the increase at 40 C and the relatively small reduction in ATP levels subsequently. The reactions studied required above normal amounts of ATP. The observed fall in cellular ATP levels was however less than expected. It seems therefore not unreasonable to suppose that the regeneration of ATP at least temporarily exceeded its breakdown. The irreversible breakdown of ATP to AMP and hypoxanthine should have led to an accumulation of the latter. This step was however not investigated.

On the basis of this and the other findings discussed above a tentative [illegible] for the premature death of heat stressed cells is offered below in Figure 6

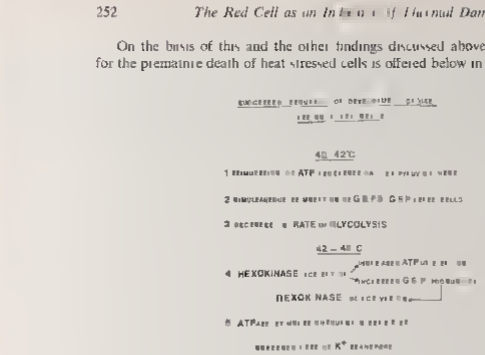


Figure 6 Suggested sequence of development of heat lesion in red cells

SUMMARY

Heat has been shown to increase cell hydration and active potassium transport increased glycolysis more than keeps pace with the energy requirements for this ATP reserves are only partly depleted suggesting that regeneration make take precedence over irreversible degradation at some stage of the heating process

REFERENCES

Baar S (1967) *Brit J Exp Path* **48**, 130
Baar, S (1968) Ph D Thesis University of Birmingham
Beyer L Slein M W Colowick S P and Cori C F (1946) *J gen Physiol* **29** 379
Christensen W R Plimpton C H and Bali E G (1949) *J biol Chem* **180** 791
Loecker de W C J and Frankeed T A (1961) *J clin Chim Acta* **6** 641
Maizels M (1960) *Proc Symp Membrane Transport and Metabolism* Prague p 256

NAKAO K., KURASHINA S., and NAKAO M. (1967) *Life Sci.* **6**, 595
NEMETHY G. and SCHERAGA H. A. (1962) *J. clem. Physiol.* **36**, 1401
PONDER E. (1949) *J. exp. biol.* **26**, 35
PONDER E. (1950) *ibid.* **27**, 198
POST R. L., MERRITT C. R., KINSOLVING C. R., and ALBRIGHT C. D. (1960) *J. biol. Chem.* **235**, 1796
PRYCE J. D. (1963) *Analyst* **88**, 560
SOLS A. (1956) *Biochem. biophys. Acta* **19**, 144
TEITEL P. (1965) *Nature* **206**, 409
WHITTAM R. (1958) *J. Physiol.* (Lond.) **140**, 479
WHITTAM R. (1962) *Biochem. J.* **84**, 110

TREATMENT OF VENEREAL DISEASES IN THE ROYAL NAVY

By Frederick E Willmott

The treatment of venereal disease in the Navy is very often the responsibility of junior medical officers who may find their first confrontation with a row of slides under the microscope and a line of complaining ratings a disarming experience For most of them, practical experience prior to entry is limited to seeing an occasional urethral discharge and possibly a chancre in the 'Special Clinic

In civilian practice venereal diseases are almost always treated by a specialist In the Navy circumstances are such that the majority are not The latter thus provides an ideal opportunity for performing the duties of a specialist which would not be available outside the Service. But one also has to accept the responsibility of a specialist and not treat these diseases haphazardly especially in view of their possible physical, psychological and social complications

The handbook on the treatment of venereal disease (B R 775) can easily be consulted and if followed ensures adequate treatment This article is a review of 300 random case histories (F Med 4) involving 157 cases of venereal disease and an assessment of the treatment given

Method

Three hundred sets of medical documents were searched for venereal case cards (F Med 16) and relevant information extracted (more information was obtained than shown but it is not relevant to this article) Eighty-eight had one or more venereal infections representing a total of 157 cases A classification of these is

Gonorrhoea	68
N S U	77
Syphilis	4
Chancroid	3
Herpes	1
Lymphitis	1
Unknown	3
TOTAL	157

The three unknown cases were

(i) Urethritis treated on board an R F A which responded to an injection

(ii) Described as a yellow discharge on the record but no further notes

(iii) Urethritis treated with penicillin but no slide taken

A W R test had been done in all cases at least once except in the three above

Treatment

	Total	*Failures*
Penicillin	55	1
Tetracyclines	1	—
Sulphas	6	3
Streptomycin	2	—
Strep +Sulphas	2	—
Penic +Strep	2	—
Kanamycin	1	—

Although only one failure is described in the fifty five cases treated with penicillin fifteen are recorded as progressing to N S U

Non-Specific Urethritis

Treatment

	Total	*Failures*
Tetracyclines	44	8
Sulphonamides	13	12
Streptomycin	2	2
Strep + Sulphonamides	8	4
Strep +Sulphas¬ Penicillin	1	1
Mist. Pot. Cit	4	—
Ampicillin	2	—
Terramycin+Strep	1	—
Erythromycin	1	1
Sulphonamides+Penicillin	1	1

Tetracyclines are seen to be the most popular and in these 44 cases, gave a success rate of 82 per cent (36)

Others

The four cases of syphilis were satisfactorily treated at the special centre and the three cases of chancroid responded to sulphonamides

Follow up and Documentation

This revealed some shortcomings Out of the 145 cases of gonorrhoea and non specific urethritis, 21 per cent (30) were not reviewed more than once and 4 were not seen after the initial visit

Only 25 prostatic massages were carried out as a test of cure, 8 at the special treatment centre and 4 by the author

Accurate documentation was a rare finding Apart from a description of the discharge (which was not always given), only very rarely was mention made of a physical examination Description of the smear findings was often confusing and the diagnosis of G C and N S U from one slide enters the realms of prophesy Very often no diagnosis was recorded

DISCUSSION

Fortunately the W R was carried out in all but three cases Follow up W R s were not always done

Treatment

(i) *Gonorrhoea*

Penicillin usually in the form of procaine penicillin (varying from 0 3 to 1 2 mega units) was the choice in 55 ont of 68 cases The reporting of only one failure is open to question as some of the 15 recorded as progressing to N S U were in fact probably penicillin failures The failure rate on procaine is usually about 10-15 per cent (Evans 1966) 11 4 per cent onl of 2 258 cases nsing 0 6 mega units, 15 per cent of 204 cases using 0 9 mega units (Warren 1968) Possibly retreatment with a higher dosage would have been successful in some cases

Penicillin is stdl the treatment of choice either (a) 1 2 mega units procaine or (b) Triplopen single injection 1 25 mega units (Warren (1968) showed only 7 per cent failure rate out of 90 cases) Failure should be followed by a higher dosage, e g , Triplopen 2 5 mega units or crystalline 5 mega nnits b d for 3 days (Evans, 1966)

Penicillin resistance or allergy is treated with broad spectrum antibiotics or, ideally, Kanamycin (Wilkinson, Race and Curtis, 1967 Csonka 1967)

(ii) *Non-Specific Urethritis*

Tetracyclines were used in 44 out of 77 cases and gave an initial cure rate of 82 per cent comparing well with results in clinical trials Although only 13 cases had sulphonamides alone it does indicate their inefficiency in this disease when used alone.

Broad spectrum antibiotics are the treatment of choice (Csonka and Rosedale 1962 Morton and Read, 1957) although streptomycin and sulphonamides together have a cure rate of about 70 per cent and are cheaper (Catterall, 1965) Most people would consider mist pot ent a placebo although some fairly good results have been obtained by Fowler (1958)

The biggest difficulty facing most medical officers will be the incidence of relapse and re infection in N S U cases Those from a different partner apparently respond to a change in drug those from the same partner mostly respond to the same drug (Morrison 1967)

Documentation

This should be as full and accurate as possible In venereology the edict of diagnosis before treatment is essential therefore the diagnosis should be recorded Ideally a full physical examination should be done and in small ships there should be ample time for this At least a genital examination is essential and the findings should also be recorded In very few documents was any reference made to actual examination

Follow-up

The cases mentioned above where no or only one review was carried out can only be deplored A case of gonorrhoea should be seen after 3 4 days and then weekly for 3-4 weeks, with routine examination for urethral discharge and a 2 glass test of the urine

For N S U they should be reviewed similarly every week for 3 4 weeks After this time in all cases an examination of the prostatic fluid should be carried out The performance of prostatic massage is adequately described in text books (King and Nicol, 1964 Catterall 1965) Normal fluid should contain no more than 3 4 pus cells/high power field If it contains more than 10/H P F and/or clumping of cells is present then prostatitis can be diagnosed (Oates 1958) In these cases the 2 glass test is no guide to the presence or absence of prostatitis

In this review 2 cases of prostatitis had records of venereal infection 12 18 months previously and 3 presented with symptoms suggestive of prostatitis after a similar period No confirmatory tests were carried out Also several cases which were described as relapses occurring over several months had not been tested to eliminate the prostate as the focus of infection Another point in favour of routine prostatic massage is that it ensures a rectal examination and possibly the exclusion of rectal venereal disease

CONCLUSION

This review of treatment by non-specialists has shown that venereal disease in the Navy is for the most part adequately treated but the necessity of conscientious treatment and follow-up is stressed It is hoped that the points brought out in the discussion may be of some help to other medical officers faced with the responsibility of treating venereal disease

REFERENCES

Admiralty Book of Reference 775 (1962) *Instructions and Recommendations relating to Venereal Disease*

Catterall R. D (1965) *A Short Textbook of Venereology* First Edition English Universities Press p 49 p 185

Csonka G W (1967) *Postgrad med J.* 43 Suppl 68

Csonka, G W and Rosedale N (1962) *Brit J vener Dis* **38** 157

Evans A J (1956) *Brit J vener Dis* **32** 251

Fowler W (1958) *Brit J vener Dis* **34** 166

King A and Nicol C (1964) *Venereal Diseases* First Edition Cassell & Co Ltd p 281

Morrison A. I (1967) *Brit J vener Dis* **43** 170

Morton R S and Read L. (1957) *Brit J vener Dis.*_**33** 223

Oates J K (1958) *Brit J vener Dis* **34** 177

Warren R M (1968) *Brit J vener Dis* **44** 80

Wilkinson A E Race J W and Curtis F R (1967) *Postgrad med J* 43 Suppl 68

WHITE CELL COUNTS IN HUMAN SEMINAL FLUID IN THE DIAGNOSIS OF PROSTATITIS

By Frederick E. Willmatt

This paper is an evaluation of the findings of white cell counts in seminal fluid (W C S F) in 10 patients with prostatitis

Method

The diagnosis of prostatitis was made by examination of the prostatic fluid, a finding of more than 10 pus cells/H P F with clumping of cells being taken as evidence of prostatitis (Oates 1958) Although not everyone would agree with the value of prostatic fluid findings (Gartman, 1958), in 6 of the 10 cases symptoms were present which resolved on treatment and 4 of the cases were referred to a specialist who confirmed the diagnosis Midstream urine examination was normal in all cases except one (J Y)

White cell counts of the seminal fluid were performed as described by Morton (1968) with modifications A specimen of seminal fluid was obtained by masturbation or coitus interruptus and examined within 2 hours of collection A glass container was used, this was felt justifiable as a sperm count was not being undertaken and the possibility of cold-shock was not relevant (Stuart Scott, 1968) The count was carried out in the same manner as for a white cell count of blood, but was first diluted with an equal volume of spermatazoa immobilising fluid (1 ml Formalin 5G Sodium Bicarbonate to 100 ml with distilled water (Kolmer and Boerner, 1945) Further dilution as necessary to enable easier counting of cells was done with normal saline The count was carried out on a Neubauer chamber The result was calculated allowing for appropriate dilution factors, as the number of cells per ml This test could easily be performed even in a small ship

Case Histories and Findings

D S 24 yrs Prostatitis diagnosed on routine follow-up of N S U
x1 previous N S U
W C S F —7 million/ml

J T 20 yrs Presented with pain in the groins, testicular pain and slight dysuria
Symptoms present 18 months Prostatic massage (Pms) revealed prostatitis
Previous episode balanitis and sub-acute epididymo orchitis
W C S F —10 million/ml

J-Y–34 yrs Persistent albuminuria
Subsequently developed pus cells in urine
Pms showed prostatitis
W C S F —18 million/ml

A.S 25 yrs Presented with dysuria, frequency and nocturia
Pms showed prostatitis
x1 previous N S U
W C S F —6 million/ml

R B 33 yrs	Presented with suprapubic aching and dysuria
	Pms showed prostatitis
	Previous history of cystitis
	W C S F —5 million/ml
J L 26 yrs.	Presented with low back pain
	Pms showed prostatitis
	Prostatitis treated three years previously
	W C S F —14 million/ml
R W 21 yrs	Presented with intermittent morning urethral discharge
	Pms showed prostatitis
	x2 previous N S U
	W C S F —5 million/ml
I.H 19 yrs	Presented with penile warts
	Routine Pms. showed prostatitis
	x1 previous chancroid
	W C S F —6 million/ml
P C. 24 yrs	Penile warts
	Routine Pms showed prostatitis
	No previous history
	W C S F —21 million/ml
R H 21 yrs	Penile warts
	Pms x2 both dry
	W C S F —12 million/ml
	Subsequent Pms revealed prostatitis
	x2 previous N S U

SUMMARY

Taking the normal level as below 2 million/ml and a level above 5 million ml as significant (Morton, 1968) all 10 counts were significant The five cases below 10 million/ml had been on treatment at the time of the count

In the case of R.H the W C S F indicated disease present before prostatic fluid was obtained for confirmation

The routine prostatic massage in the case of penile warts is part of another project

CONCLUSION

Although the number of cases is too small to be of statistical significance the results do indicate that the W C S F is a valuable ancillary test in the diagnosis of prostatitis The test is simple and easily performed even onboard a small ship and the seminal fluid is often more easily obtained than prostatic fluid

REFERENCES

Gartman E (1958) *Brit J vener Dis* **34** 181
Kolmer J A. and Boerner F (1945) *Approved Laboratory Technic* D Appleton-Century Co Inc. p 268
Morton R. S (1968) *Brit J vener Dis* **44** 72.
Oates, J K (1958) *Brit J vener Dis* **34** 177
Stuart Scott L. (1968) *Hospital Medicine* **2** No 6 644

Letters to the Editor

Sir

Acceptance, Rejection or Prevention

Recent articles and Editorial comment on the Service sociopath prompt the writing of this letter

In view of the current run down of man-power in the Navy, advice is sought on the propriety of selecting for premature discharge those personnel who have displayed overt signs of personal inadequacy

Undue compassionate turbulence resulting in cancelled drafts/appointments repeated reference to N/P opinion and lowered medical category together with associated disciplinary lapses, are the signs one has in mind

Such personnel pose drafting and administrative problems quite out of proportion to their worth to the Royal Navy In some cases although the man may himself be a worthwhile member of the Service, his wife can in her own right create an atmosphere in which neither the individual nor the Service has any prospect of mutual advantage.

It is thought that the present time provides an opportunity to have a clear out of this dead wood but it is open to question whether this discharge should be by invaliding or as Unsuitable' The latter would seem to be the more appropriate description of such persons

Would any of your contributors or readers care to comment? These suggestions are put forward solely to stimulate discussion but in so far as they may be thought to reflect an opinion, it is entirely that of the writer

Yours faithfully,

JOHN TRAVERS MORGAN

Surgeon Captain RN

(Surgeon Captain Lamb was invited to reply to the above *Editor*)

Sir

I have to admit that I have wondered why I have been asked to reply to Surgeon Captain Morgan's letter about 'Acceptance Rejection or Prevention Can it be because I am known to be a medical "square"?

He has highlighted a problem that will be with us so long as the State puts so much emphasis on Welfare and so little on solving one's own personal problems I consider that the Service must face up to the fact that these cases exist but in my opinion far more of them should be dealt with by the Executive most of them are primarily a Divisional and not a medical matter and only become medical after the Executive have failed to sort them out

Is it not time we stopped giving psychiatric labels to ever[illegible] discontent and petty malefactor, and time we made them understand that they have undertaken a voluntary contract when joining the Royal Navy and had better get on with it or else?

Is it not time we stopped being blackmailed (and blackmail it often is) by discontented wives who are too immature even to contemplate managing while their husbands are away, but nevertheless knew when they married that some separation was inevitable?

Is it not time we raised the age at which marriage allowance is paid and so discourage the almost casual alliances that often take place at an age when neither husband nor wife can be considered mentally mature whatever their physical precocity may be?

Sometimes, when looking at my increasing grey hair in the shaving mirror I think back to the Navy before the war a Service that was generally contented and efficient, and in which the words 'compassionate' and 'welfare' were seldom heard and there were no psychiatrists and few psychiatric cases but perhaps we didn't recognise the cases when they appeared! Those were the days when naval families were barely admitted to exist by the authorities but I am not convinced that marriages were any less happy for that and there was certainly a much more healthy attitude of helping oneself in difficulty and not running to Welfare at the first hint of trouble.

If this letter gives the impression of gloom or even suggests to some that I am a psychotic case myself there is a basic truism one should always remember — that about 90 per cent of one's Sick Bay clientele is drawn from about 25 per cent of the Ship's Company barring Acts of God one seldom sees the other 75 per cent and they are still the salt of the earth.

In conclusion if my remarks provoke discussion or even anger they will have served a purpose. Because whatever the outcome few medical officers will deny that a problem exists. And by the time that any storm breaks I shall be safely on the Retired List!

Yours faithfully,

FRANCIS H. LAMB

Surgeon Captain RN

Reviews

R[illegible] Advan[illegible] R[illegible] TUBERCULOSIS Edited by Frederick Heaf CMG MA MD FRCP [illegible] Ronald Ridsby MA DM FRCP Sixth edition Pp viii + 234 with 1 full-[illegible] London J & A Churchill Ltd Price 55s

It is always [illegible] welcome opportunity of reviewing a book of which not only [illegible] of the [illegible] but [illegible] of the editors is a civilian consultant to the Royal Navy Dr W H H Raw [illegible] the Consulting Physician in Diseases of the Chest [illegible] RN and contributor [illegible] Surgical Methods of Treatment in respiratory tuberculosis

The [illegible] chapter [illegible] dealing with the additional chapters in this book [illegible] has been published [illegible] following the last edition Sections have been written [illegible] number of distinguished authorities in various aspects of this subject and particular [illegible] has been placed on the [illegible] facing personnel engaged in combating tuberculosis [illegible] keeping [illegible] with [illegible] changes being confined to this problem This is most [illegible] and opportune coming [illegible] September 1957 a three-day international conference [illegible] at the Royal College [illegible] Surgeons in London to discuss the chemotherapy of [illegible] and develop [illegible]

In addition to therapy [illegible] sections covered are those of epidemiology and prevention [illegible] and BCG vaccination respiratory function and finally an excellent assessment [illegible] called atypical tuberculosis or more aptly termed opportunist mycobacterial [illegible] together this is an excellent book which attempts to clarify the problems still [illegible] and [illegible] fragment of [illegible] tuberculosis both in this country and abroad

LGT

DECOMPRESSION OF COMPRESSED AIR WORKERS IN CIVIL ENGINEERING Edited by R I McCallum MD(Lond) Pp xii + 328 Newcastle-upon-Tyne Oriel Press Ltd Price 42s

This book contains the proceedings of an international working party held at the Ciba Foundation London in October 1965 which brought together both physicians and engineers [illegible] with the management of men working under increased atmospheric pressure The principles of decompression tables and the tables currently in use in nine countries are reported and discussed together with the differences of the different schedules

It is obvious from the discussions that the decompression tables tend to be a compromise between a theoretical ideal decompression based on [illegible] physiological facts and a commercially acceptable duration of decompression Difficulties were found in that even the [illegible] of decompression sickness varies between doctors from different countries While the principles [illegible] followed were generally agreed the regulations for compressed air workers in some countries [illegible] back on the progress of physiological knowledge

Sections in the book [illegible] also devoted to the treatment of decompression sickness and [illegible] research in this subject

This book will be valuable background reading for any doctor who is likely to be the [illegible] officer supervising the men of men working under pressure Whilst not being a specialist book it [illegible] readability both of symptoms and of the progress of [illegible] sickness

JMY

PROCEEDINGS OF THE THIRD SYMPOSIUM ON UNDERWATER PHYSIOLOGY Edited by C J Lambertsen Pp 407 + xx Distributed in UK by E & S Livingstone Ltd Edinburgh and London Price £6 15s 0d + 4s 6d postage

The book illustrates very well the growing interest and volume of research into all [illegible] underwater physiology The first symposium in 1955 was attended by just over a [illegible] and [illegible] filled in a 150-page soft-covered book This symposium was attended by [illegible] 300 people from 10 different countries and has resulted in a 500 page hard backed book [illegible] size of the book in no way signifies its scientific worth this volume contains much [illegible] of the behind interest to all those interested in increased atmospheric pressures both [illegible] hyperbaric therapy

The progress [illegible] the last 13 years is well portrayed with extensive bibliographies while [illegible] of research are indicated Important aspects discussed are the physiological [illegible] both on short duration ('bounce') and long duration ('saturation') diving The [illegible] of [illegible] sickness the dangers of a flare in a hyperbaric environment and [illegible] nitrogen toxicity and the action of anaesthetics

What [illegible] of the symposium [illegible] the future Dr [illegible] in his article that [illegible] will be required to accumulate the [illegible] accurate basic physiological [illegible] to develop the complex [illegible] that important extension of [illegible] possibilities [illegible] hold out [illegible] J M Y

[illegible] STEROID THERAPY By Peter Thomas Pp [illegible] + 223 London Lloyd-Luke (Medical Books) Ltd Price 37s 6d

[illegible] may be described as an aid to those who have lost direction [illegible] book that came at a time when many of us feel this way about The Steroids

How many ardent prescribers of The Pill for example appreciate what it is all about [illegible] that the amount of progestin is critical and an excess may produce atrophy of the [illegible] with amenorrhoea?

[illegible] appreciate that at least 800-1 000 mgms of intravenous hydrocortisone should be given over an eight hour period in severe status asthmaticus?

Why should corticotrophin be used in preference to the cortisone derivatives and why?

All these very common and vital questions are clearly and unequivocally answered in this excellent text

Its all-embracing and systematic coverage of this important subject is both [illegible] and remarkably readable I think perhaps the subject is so well covered that more might have been said about the dangers and pitfalls of cortico-steroid therapy but otherwise the text is hard to fault In particular the exhaustive bibliography and index [illegible] with which the author writes and serves to reassure the occasional sceptic

This is an extremely well written book which should be in 1968 the closest companion of every GP hospital doctor and final year student, all of whom I am sure have become progressively bewildered by the therapeutic maze of this branch of chemotherapy R V W

TREATMENT OF ACUTE COMMON POISONINGS By Henry Matthew and A A H Lawson Pp vii + 151 London and Edinburgh E & S Livingstone Ltd Price 16s + 11d postage

Acute poisoning accounts for nearly 10 per cent of admissions to many general hospitals and this book sets out to guide those who are faced with this problem from the great experience of the Poisons Treatment Centre at the Edinburgh Royal Infirmary

The first part of the book outlines the scale of the problem of acute poisoning and deals with some methods of identification of drugs

The second part gives an account of the basic principles of medical treatment and discusses the technique and value of a number of specific methods of treatment designed to promote rapid removal of drugs from the body The authors point out that in a recent survey of 1 540 patients 95 per cent required intensive supportive therapy only

There is a chapter on the psychiatric aspects of poisoning The rest of the book deals with the manifestations and management of specific poisonings There is a list of telephone numbers of the poisons information services on the back cover

This book is clearly and concisely written with a good index and valuable cross references in the text allowing one to use the book very rapidly It disposes of a number of myths about acute poisoning some ancient some modern

Anyone who may have to treat these patients would benefit by reading the first part of this book and it should be readily available in the admission room of our hospitals J F R

MEDICAL TREATMENT A Textbook of Therapy in Four Volumes Edited by Kenneth Maclean MD FRCP and George Scott MD MRCP Third edition Volume I Cardiovascular and Respiratory Diseases (including Tuberculosis) Pp viii + 289 London J & A Churchill Ltd Price 40s

The third edition of this book published six years after the previous one takes on a new form in so far as it is being produced in four volumes with paperback covers to minimise cost and it is hoped at intervals of three to four months during this year and 1969 The chapters and page numbers will be consecutive throughout the four volumes the last of which will contain a comprehensive index referable to the whole book although there is a short 11 page one in this volume With one exception all the contributors are either members of Guy's staff or ex-Guy's Hospital trained and this helps to preserve a uniformity of approach It is sad to see the name of the late Dr P H Kendall amongst the list

The aim of this book is to attempt to keep pace with the rapidly changing methods of treatment and the new drugs which are being encountered in medicine during the 1960s As a result three-quarters of the new edition will have been completely rewritten by the 12 specialised contributors and each volume will be up-to-date when published

In this first volume the seven chapters, three [illegible] the therapy in respiratory tract diseases and [illegible] additions with four embracing all aspects of cardiovascular lesions. The reviewer was particularly impressed with the brief but concentrated chapter on cardiac arrest resuscitation and acute circulatory failure (22 pages) with the listed equipment and drugs for the cardiac resuscitation emergency trolley especially valuable. The 26 page chapter on the treatment of hypertension is again completely up-to-date and full of informative therapeutic data.

More than half the book is taken up by the two chapters on treatment of diseases of the heart, thoracic lungs and pleura and this is presented in a clear authoritative manner.

The above are merely small selected references to this excellent approach to therapy in diseases of the cardiovascular and respiratory systems and if the remaining volumes are compiled with equal dexterity this book will contrive to be highly recommended to all students of medicine at a total price well within everyone's pocket.

LGT

THE SURGERY OF THE COMMON CONGENITAL CARDIAC MALFORMATIONS. By Christiaan N. Barnard and Velva Schrire. Pp 179. Figs 47. London: Staples Press Ltd. Price 50s.

Barnard and Schrire's small book has the clarity and logic one would expect of the leaders of the first heart transplant team. In they have the ability to make complicated problems look amazingly simple and their lucid descriptions and candid diagrams pin point the essential key to every surgical challenge.

Intended primarily as an introduction to the surgical problems of congenital deformities the authors are content to provide a comprehensive classification based upon the most suitable type of surgery available to each group and wisely select for detailed consideration the five most common conditions although they assume a knowledge of by pass techniques unlikely to be found among many of their readers.

The book will be appreciated not only by the Fellowship candidate for whom it must be considered mandatory but also by any clinician with an interest in the heart, for the direct authoritative style backed by unrivalled experience enables the authors to present every important facet of each problem without the sacrifice of essential information. Aetiology, haemodynamics, the clinical picture, indications for surgery, operative techniques and post operative care all have their place and reasons are given for the views that are held and the procedures which the writers recommend. It is refreshing to find a book which accomplishes its purpose so successfully and with such economy of words.

JW

SURGICAL PRINCIPALS. By James Moroney and Frances E. Stock. Pp ix + 371. Illustrated. Edinburgh and London: E. & S. Livingstone, Ltd. Price 65s + 3s postage.

Undoubtedly the chief value of this latest attempt to assess the interest of the surgical novitiate who contemplates with dismay his introduction to a specialty diversified and expanded into a multidisciplined complex will be found to lie in the quality and profusion of the illustrations and their relevance to the text. They include line diagrams, clinical photographs, several of which rival in talent X-rays and many excellent drawings and colour prints. The book owes much to Professor Stock's long experience of surgery in the Far East and the more unusual cases come from his collection which the text bears the unmistakable stamp of Mr. Moroney's gift for the simple and succinct presentation of essential limbs in a most agreeable manner.

It is an unusual book and the authors are to be congratulated upon their courage in breaking new ground by relating the patterns of surgical disease to its pathogenesis, so that surgical diagnosis and technique are learned by way of the consideration of congenital anomalies, the mechanisms of injury and repair, obstruction, fluid balance, space occupancy, degeneration, allergenic conditions and the influence of metabolism and the endocrine glands. It is an approach which should make the book as stimulating to the surgical trainee as to the undergraduate or nursing sister, not only because it raises controversial questions but because its correlation of surgical information is the sort of exercise which examiners love. The chapters on fluid leakage, space occupancy and surgical diagnosis are particularly good examples and the inhalation principles of management are readily memorised.

The publishers have gone to a great deal of trouble to capture the spirit of the book in the type settings and textual arrangements they have chosen. The result justifies this effort. If the book does not escape criticism it will be largely because surgeons are essentially individualists and some of the techniques advocated such as hypothermic therapy for peripheral vascular disease run contrary to experience. Nevertheless this book is a brave attempt to break new ground and provide an interesting introduction to a fascinating if formidable speciality. In this it can claim to have succeeded.

JW

THE PLASTIC SURGERY ATLAS. By Professor Mudr. Franusek, Purkan Czechoslovakia. Volume I: General. Pp xvi + 200 with 165 illustrations. Volume II: Head. Pp viii + 509 with 330 illustrations. Volume III: Trunk and Extremities. Pp viii + 224 with 142 illustrations. London: Butterworth & Co. Price £21 0s 0d per set.

The three volumes of this beautifully illustrated atlas are essentially a documentary of

ous man's work and teaching. Indeed, Butzin pioneered the specialty of plastic surgery in Czechoslovakia in much the same way as Gillies in England and Bimaux they both lived through the same era. It is now available that the records of their personal experiences should strike a common chord. They also share the same publishing for Butzin's writings predated The Principles and Art of Plastic Surgery by Gillies and Millard and the format of Butzin's work is similar. If it lacks the racy style and technical ingenuity of the incomparable Gillies the reader will nonetheless find the more orderly arrangement of the vast material the succinct introductions to each section and the co-ordination of the drawings with minimal photographs are adequate in enough compensation.

The atlas is more practical than academic, the first volume providing a detailed and comprehensive introduction to the principles and techniques of plastic surgery which can be readily mastered by any well trained surgeon. In fact the author's declared objective is to dispel the aura of mystique which has surrounded plastic surgery and his step by step illustrations go a long way towards proving the point. They run all simple line drawings on a pastel background with the essential step in technique emphasised in solid colour and there are enough of them to make the text almost superfluous.

Either because the work is chiefly a record of the art of plastic surgery in Czechoslovakia or more probably because of the necessary limits that must be imposed upon a practical manual of this nature the volume dealing with regional surgery seems few illustrations techniques which British surgeons might not always consider the best now available. For instance, the complex problem of mid-lip and palate are exhaustively reviewed and clearly illustrated yet current debate upon operations for Dupuytren's contracture and breast reduction receive scant attention while some modern gamut urinary techniques are ignored. There is also a very inadequate bibliography. Nevertheless the excellence of the illustrations is maintained throughout and therein lies the special appeal and usefulness of this work to the busy surgeon. It is the magnificent record of a great pioneer with much more moment for his junior than has hitherto been manifested in this field. Through its pages we glimpse a generous humanitarian writer of principle painstaking cultured artistic and technically competent a great man as well as a great surgeon.

JW

FUNDAMENTALS OF CURRENT MEDICAL TREATMENT. Edited by C. W. H. Havard, M.A., D.M., M.R.C.P. Revised and Second Edition with Supplement 1968. Pp. 875 + 64 page supplement. London: Staples Press Ltd. Price 70s.

It is three years since this book was introduced into the range of modern textbooks of therapeutics and in order to keep abreast of current advances in scientific medicine this revised edition has been published. There are 20 contributors and 23 chapters in all but three of which there are recent supplements, so that the latest therapeutic measures may be recorded. In discussing therapeutics one has to remember that nearly one half of the prescriptions today are for drugs which did not exist five years ago.

This book is intended primarily for the student, general practitioner and junior hospital medical officer and therefore must have an established place on every hospital library shelf. One important point for mention is that both the approved and proprietary names of drugs are given so that there is not quite the same requirement for reference to the British National Formulary or to Mims. In this age of book it is possible to find chapters on all the ailment systems of the body with additional sections on gut microbial therapy, the neuroleptic drugs, psychiatric and skin diseases, tropical infestations, venereology and industrial poisoning.

After the index there are the 14 pages of supplement, bringing the majority of the chapters instantly up to date and it is hoped that there will be regular supplements in the future which can be bound into the current edition thus guaranteeing a permanently modern approach to the subject of therapeutics.

This is not an expensive book and it can be strongly recommended to all practising clinicians.

LGT

HANDBOOK OF HUMAN EMBRYOLOGY. By R. W. Haines and A. Mohiuddin. Fourth edition. Pp. 232. Edinburgh and London: E. & S. Livingstone Ltd. Price 27s. 6d. Postage 1s. 3d.

This is a pocket sized book with a soft cover. The format is pleasing and the blank and white line diagrams are to the whole good. It probably helps more in the understanding of pure anatomy than as an aid to the understanding of the developmental abnormalities.

A chapter on the causes of acquired diseases in intra uterine life would have been welcome.

Of particular interest to the reviewer was the chapter on the genital system which was rather less well done than one would have hoped. The genital and urinary systems are dealt with in separate chapters perhaps it would have been better to have studied them together as they are so closely related anatomically and embryologically.

The book is [illegible] as one to be [illegible] the fact that they have sometimes been sacrificed to [illegible]

Having said this the reviewer is happy to [illegible] collection of books

D.E

A SYSTEM OF OPERATIVE SURGERY AND FRACTURES By A. Graham Apley, MB, BS, FRCS. Third edition. Pp. xx + 547. London: Butterworths. Price £6 6s. 0d.

Mr. Apley, who is Consultant Orthopaedic Surgeon at Pyrford, has long been hailed as a master of the fracture clinic. This is the third edition of his book first published in 1959. The volume is clinical from notes prepared for the FRCS course. It contains a wealth of material in relatively small space, presented to us in concise readable manner with a standard pattern of headings for each orthopaedics and fractures. A constant sequence is maintained for the description of physical signs. The student is taught to *look, feel* and *move* before turning to X-ray. Table he can profitably refer throughout his professional career.

The edition includes all the latest developments in orthopaedics but the highlight of the book is the inclusion for the first time of illustrations. This array of X-rays, photographs and diagrams is derived from a collection assembled during the 20 years of the Pyrford clinic. The illustrations have been combined into composites, each of which tells its own story, being the author's contention that no matter how good a single illustration may be it is more effective for teaching when combined with others in meaningful groups. Composites are used to show the stages in a process, to highlight important physical signs and to contrast differing methods of treatment. The author has grouped 1802 separate illustrations into 12 composites and these may be used in their own for quick revision. The only criticism which can be levelled at this method is that to make a composite it has proved necessary to reduce each individual illustration to a size which in some cases has resulted in loss of clarity. Nevertheless the overall quality is exceptionally high. The book is a must for the postgraduate student and is no doubt useful to the more adventurous undergraduate. It is of particular value for tutors preparing lectures on orthopaedic subjects and essential also for surgeons engaged in the care and management of orthopaedic and fracture patients.

P.D.G.F

ORTHOPAEDIC NURSING By Mary Powell, SRN, MCSP, Matron, Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, Shropshire. Sixth edition. 1968. Pp. viii + 630, fully illustrated. Edinburgh and London: E. & S. Livingstone Ltd. Price 55s. + 4s. 6d. postage.

This book is written primarily for nurses and physiotherapists working in orthopaedic wards with a training for the Orthopaedic Nursing Certificate. However all those engaged in orthopaedics in the wards and departments of general hospitals will also find it of immense value. Sir Reginald Watson Jones remarks in the foreword to the book that Miss Powell knows all the tricks of orthopaedic nursing — how to make a splint comfortable for the same time it does its job; how to apply plaster of Paris casts and fit supports and appliances and even how to correct flexion contractions of the knee joint in a Thomas splint. Moreover she can teach others to do the same. That all this is so is borne out by the fact that the book has reached six editions since first published in 1951. There is much to full in the text which is lucid and in line with modern thought. Some of the illustrations are perhaps a little dated but by and large they too are excellent. The book is well produced and good value at 55s.

P.D.G.F

PORPHYRIA — A ROYAL MALADY By Dr. Ida Macalpine and her colleagues. Pp. viii + 68. 17 illustrations, two tables. Four articles published in or commissioned by the British Medical Journal. Price 12s. 6d.

In the first article of this delightful collection Dr. Ida Macalpine and Dr. Richard Hunter delve deeply into the illness of King George III and conclude that he was a classic case of porphyria.

In the second article the authors are joined by Professor Rimington to trace porphyria in the Royal Houses of Stuart, Hanover and Prussia from Mary Queen of Scots to Princess Charlotte. The purpose of this study is stated to be to establish the diagnosis of porphyria and if doubt. Search for a living member in whom abnormal metabolites could be demonstrated was made and two patients were found who shared common ancestors with George III. A study of the historical implications of this research is the third article by Dr. John Brooke. The fourth is an account of the Porphyrias by Professor Abe Goldberg.

The effects of illness in the great on the course of history is always a fascinating subject and this magnificent piece of historical research includes much material drawn on for the first time and particularly that hitherto unknown in the library of Lambeth Palace.

This little book is beautifully printed and illustrated and must give great pleasure and interest to the many people who read it. Of course its publication serves to underline how appallingly little the scientific method has influenced medical thinking and particularly that applied to Chemical Pathology while in Historical Research it is not possible to rely on empiricism. This incompatibility has led to an amusing and learned correspondence in the medical journals and has ensured that for several years to come fewer stalwarts from porphyria will have their diagnoses missed.

P S F

HEARING MECHANISMS IN VERTEBRATES. A Ciba Foundation Symposium. Edited by A. V. S. de Reuck and John Knight. Pp. 310. London: J. & A. Churchill Ltd. Price 65s.

As in other volumes in the series of Ciba Foundation symposia the standard of excellence both in scientific sense and in quality of paper print illustration and editing. For the ontophysiologist or zoologist, and especially those concerned with auditory function, the book is invaluable. On the other hand it is almost as good as its link of attempt to clothe the anatomical histological and physiological information in the practical applications of that knowledge. For instance, it would be most helpful to have the opinion of such a body as Lipscomb on the mechanism of such clinical phenomena as tinnitus recruitment the decay of the 4000 Hz dip in noise induced hearing loss the conditions of inability as the Lempert tympanometer in persons with brain disorders.

In summary the book is excellent for the fundamental research worker but disappointing for those whose interest in the subject stems from its primarily clinical applications.

R. R. A. C.

TEACHING THE PHYSICALLY HANDICAPPED HOW TO SWIM. By Wm. Anderson. Pp. 84. London: Faber & Faber Ltd. Price 15s.

What a charming and useful little book! William Anderson has in the simplest terms shown unwaveringly just how much learning in swimming can do for the handicapped person. Not only those with physical deformities or paralysis but the blind and the deaf. In all these cases the gentleness and patience can soon be rewarded by the support given by the water and the sense of mastery must be a new environment may work wonders with mentally and in many cases assist in physical improvement. This is more than just hydrotherapy. It is a positive nutrient on a well being.

The author's experience and knowledge can be gained in his results is delightfully portrayed both in the text and simple illustrations. His many pictures support his claims and his enthusiasm is shown by his chapters on exercises, group teaching and plans for a learner pool.

This publication certainly points a way to giving a great deal of comfort and happiness to many disabled people.

S. M.

ASCULTATION OF THE HEART. By R. W. D. Turner, O.B.E., M.A., M.B., F.R.C.P., F.R.C.P.E. Third edition. Pp. vi + 53. Edinburgh and London: E. & S. Livingstone Ltd. Price 6s. postage 5d.

Dr. Turner's didactic writings on cardiology are both well known and popular. Witness his book on Electrocardiography which has long disappointed many booksellers and I hope many deserving students. As physician in charge of the Cardiac Department of the Western General Hospital Edinburgh he writes from experience of both the student and the postgraduate and the fact that the first two editions of this small booklet reached 10,000 copies speaks for itself.

What is the new approach in auscultation which is undoubtedly proving so popular? We are rightly asked to abandon the old and conventional terms of auscultation and to discard the mediate but inaccurate description 'the ejection murmur'. Instead it is taught the more rational interpretation of the heart sounds and murmurs requires mental disciplines to listen to one feature at a time and the unanimous practical experience.

We have all been confused by the clinics the opening snaps the closing snaps the splitting of sounds the gallop rhythms and the triple rhythms of modern cardiology. In this little book and for a bare six shillings Dr. Turner has done much to help to put him at his ease in order.

J. M. C.

PERIPHERAL ARTERIAL DISEASE. Vol. IV in the Series Major Problems in Clinical Surgery. By Wiley F. Barkin, M.D. London: W. B. Saunders & Co. Ltd. Price £3 12s. 0d.

This is an important and worthwhile monograph and is concerned with occlusive rarefied disease of the lower limbs. Occlusive changes in these regions, linking the diminution singularly of coronary and cerebral atherosclerotic changes were not widely appreciated until the work of Leriche. A great impetus to treatment has been provided by the recent advances in arteriographic techniques. Unfortunately this technique will at present accurately demonstrate occlusion only in a major artery and many of the occlusive changes in the lower limb

diabetes and thrombotic obliterates — occurring primarily in the small peripheral vessels. Occlusive changes in these smaller vessels are at present beyond the scope of reconstructive surgery.

The book contains many gems of wise comment though it is perhaps a pity that many are interspersed within the sections code e.g. the details of operative technique. The book opens with a short and detailed exposition of the anatomy, physiology, pathology and diagnosis of peripheral vascular disease and these sections are of interest to all disciplines as is the excellent chapter on the evaluation of patients for treatment. Conservative measures are described in detail and the regions of local measures designed to improve collateral circulation in the failing circulation is well evaluated. The relief of claudication achieved by altering the gait and reducing the work of the gastrocnemius is rightly stressed and one final with the physical limits recommended before proceeding to division of the achilles.

Vascular occlusion may progress to amputation and the principles laid down for such an end result procedure in peripheral arterial disease are clearly stated. Lumbar sympathectomy is recognised as a critical and useful procedure not to be dismissed as merely an early operative procedure in vasospastic arterial disease, or as an operation preceded historically only by Buerger's bypass of a popliteal aneurysm.

The three detailed chapters on aorto-iliac femoro popliteal and combined lesions are of interest only to surgeons and possibly radiologists concerned with arteriography. The results of arterial reconstruction for chronic occlusion are considered and the author's large series is reviewed. The author's preference for endarterectomy is reflected in its preponderance in this series but other series are reviewed together with a thought provoking review of the criteria for the choice of operation. It is the author's experience that grafting is easier to learn than endarterectomy.

The book closes with a considered review of the complications of vascular surgery and each chapter encloses a wide bibliography with a total of nearly 400 references.

This monograph constitutes the whole problem of peripheral vascular disease, the fewer limb and it is this whole problem which needs to be considered by physicians, surgeons and radiologists. The operative procedures detailed are no longer in the forefront of experimental surgery but proven procedures which form part of the management of peripheral arterial disease, both in the civilian and the service patients that form part of Naval Hospital practice.

J A B H

THE YEAR BOOK OF RADIOLOGY 1967-68 SERIES. Edited by John Floyd Holt, MD and Walter M Whitehouse MD. Pp 451. Year Book Publishers, Chicago — obtainable in UK from John Wiley & Sons Ltd, Chichester. Price £6 2s 0d.

This is a well established and accepted extract of the Year's Radiological literature. Each section is comprehensive and one should not cavil at the selection of abstracts. The present volume contains many simple case reports of fine sufficient and complete as abstracts. It is a pity that the Radiodiagnosis and Radiotherapy sections are not published separately.

The book is essential reading for all radiologists since without it the general radiologist would be hard pressed to even scan the year's literature. The book should be in every Diagnostic X Ray Department and available in all hospital libraries.

J A B H

THE URINARY TRACT — ROENTGEN DIAGNOSIS. By J R. Thornbury MD, DA Culp MD. Pp 431. Illustrated. Year Book Publishers, Chicago — obtainable in UK from John Wiley & Sons Ltd, Chichester. Price £6 2s 0d.

This well produced handbook is designed as a reference book for the medical student and general practitioner as well as urologic and radiologic specialists. It meets the reference needs of the student and general physician and surgeon. It briefly outlines the radiological techniques available including cystourethrography, renal arteriography, nephrotomography, pyelomegraphy, ureteral ureterography and epididymography and lymphography. The bulk of the book is composed of clear 2 and 4 page illustrations of radiographs of the X-ray diagnostic procedures of specific conditions. It is probably too detailed for students but cannot be classed as a reference book for specialists in Radiology or Urology. The book could be carefully scanned by trainee specialists and would serve as an introduction to the subject for trainee urologists and radiologists.

J A B H

PRINCIPLES OF X RAY DIAGNOSIS. By David H Trapnell MA, MD(Cantab), MRCP, FFR, DMRD. Pp ix + 291. Loedee, Butterworth & Co Ltd. Price £6 10s 0d.

Unlike many text books which claim to be both primarily intended for those commencing full-time course in radiology and to be of value to trainees in other specialities this slim volume fulfils its objectives admirably. It forms a textbook volume to the Principles series and is well produced and illustrated. It should be regarded as the first volume and the initial volume for reading before the more specialised volumes on Chest, Skull and Bones.

The book concentrates on the principles that lie behind diagnostic radiology and attempts to inculcate a system of observations and deduction how to look at radiographs is linked with what to look for in them It makes a logical attempt to mash the almost unmanageable fact which is so essential in radiology

The first line of the first chapter should be printed across the top of every X ray request form as a reminder to all — Radiographs like photographs, must be made correctly if they are to be useful

An admirable volume for all students of radiology and all post graduate clinical students whatever their speciality J A B H

PATIENT STUDIES An exercise book for the guidance of students in the preparation of detailed accounts of patients who whom they have cared London and Edinburgh E & S Livingstone Ltd. Price 9s 6d + 3d postage

A very well prepared book which includes a complete skeleton framework within which every detail of the patient and his treatment may be recorded

This book is so complete that the student has an opportunity for the use of her own initiative All headings are set out for her and blank sheets provided for every purpose (Even a diagram of the patient on which to illustrate the observations made)

This is an ideal Case Study Book to be used perhaps by the Tutor as a guide when marking and assessing the students work but not I think for general use to the students themselves

We sometimes many so called Case Studies as simple copies of the text books and this beautiful notebook requires even less thought and effort on the part of the student.

The notes at the beginning — Thoughts about the use of a Patient Study Book — are very useful and helpful I would like to reproduce them for each student separately from the rest of the book

A valuable book if used carefully by the Tutors but making life much too easy for the students who must be encouraged to think C F C

FOUNDATIONS OF ANATOMY AND PHYSIOLOGY By Janet S Rose and Kathleen J W Wilson Third edition Pp viii + 474 London and Edinburgh E & S Livingstone Ltd Price 32s. 6d + 1s 3d postage.

The authors of this book have a thorough understanding of the needs of the student nurse in her study of Anatomy and Physiology They have set out to produce a neat and concise text book and have succeeded admirably

Structure is well related to function and sufficient detail is included to ensure good understanding of the abnormal conditions she comes will meet in her everyday work

The chapters on Digestion and Metabolism and on the Nervous System are particularly good (subjects which most nurses find difficult to grasp)

An extremely useful book for Nurse Tutors and Student Nurses C F C

PAEDIATRIC CARDIOLOGY Edited by Hamish Watson TD, MD FRCP(Ed) MRCP(Lond) Pp xx + 996 Illustrated London Lloyd Luke (Medical Books) Ltd Price £13 0s 0d

Sophisticated techniques have demonstrated our dependence on basic anatomical and physiological information in the evaluation of disease but if congenital or acquired and one medium medium demands increasing knowledge of small and smaller fields We think Lore great this encyclopaedia of Paediatric Cardiology which must become the best reference book on the subject in the English language

Dr Hamish Watson who is the Consultant Cardiologist to the Dundee Group of Teaching Hospitals has edited this remarkable volume in which he has no less than 38 other international contributors drawn from the United States Holland Belgium Sweden and the United Kingdom Dr Watson's feat has been to collate and integrate these individual and independent opinions into this book without undue repetition and so produce an indispensable volume for anyone interested in paediatric cardiology either as a clinician or a pathologist

The 68 chapters in this volume of just under a thousand pages cover every aspect from embryology and anatomy to the congenital and acquired disorders of the heart in infancy and childhood Selection of any particular chapter for especial comment would be invidious but it is delightful to see the hand of Dr Maurice Campbell in two chapters on the names and limitations of malformed hearts and several contributions from Dr Samuel Kaplan At the end of every chapter there is an except onally good bibliography

The need for a book of these dimensions is emphasised by the profusion of the literature on the subject and we will long be grateful to the many authors and their institutions either for collecting so much information together The publishers too must be congratulated on a production which can only add further credit to their already unassailable reputation and they can look forward to finding it on the shelf of the library of every paediatrician and every hospital where there is an obstetric or paediatric department. J M C

METABOLIC AND INTERNAL PHYSIOLOGY By Jay Tepperman MD Second edition Pp 250 Chicago Year Book Medical Publishers Inc Obtainable in UK from John Wiley & Sons Ltd Chichester Price 80s

This book appeared in its first edition in 1962 and has now been widely revised in the light of recent advances in this rapidly expanding subject It is primarily intended for the undergraduate but certain chapters with endocrinology for the first time Dr Jay Tepperman is Professor of Experimental Medicine at Syracuse New York and I suspect that the meat of this excellent textbook will prove rather strong for the palate of the English undergraduate He will return to it however with a greater appetite after he has qualified and will find it valuable reading for Membership or Primary FRCS

It is refreshing to find a textbook putting modern developments in their historical perspective and each chapter opens with a chronology of the major landmarks in progress Dr Tepperman traces his way through the labyrinth of modern endocrinology with a sure touch His text is authoritative but not dogmatic and he has a sense of humour His histology illustrations are well reproduced but unfortunately all the other photographs are of rats subjected to a variety of endocrinological stresses It is right that the importance of comparative physiology should be emphasised in a textbook of this kind but while *homo sapiens* and the white rat have characteristics in common their differences fortunately are legion This is a good book and deserves to be widely read G J M T

THE RESCUE SHIPS By Vice Admiral B B Schofield and Lieutenant Commander (SP) L F Marlyn with a foreword by Sir John McNee Pp 172. London Wm Blackwood and Sons Ltd Price 30s

The lessons learnt at great cost in one war have all too often to be relearnt in subsequent conflicts In 1917 the Vice-Admiral at Milford Haven considered it absolutely essential to have a small vessel of some description with each convoy to pick up survivors This sound advice was neglected by the Admiralty at the time and no action was taken in the Second World War until it was more than a year old

Eventually it was the Rescue Ships specially equipped Merchant Navy vessels which fulfilled this dangerous but rewarding role escorting a total of 757 convoys and rescuing 4 194 survivors The hazards and difficulties of this enterprise and the bravery of those who took part is almost unexcelled in offering histories of the war and this fascinating book puts the record straight

Each rescue ship carried a Naval Medical Officer and a Sick Berth Attendant but it is hard to read of the total indifference of the Medical Department of the time to the whole concept The medical organisation that evolved was almost entirely due to the efforts of Surgeon (later Admiral Sir John McNee and Surgeon Commander R S Kedland RNVR

This is a most interesting and well produced book which should be read by all Naval Medical Officers As a branch we cannot afford to be indifferent to such problems in any future war at sea G J M T

MAY AND WORTH'S MANUAL OF DISEASES OF THE EYE By T Keith Lyle Alexander G Cross and Charles A G Cook Thirteenth edition Pp xi + 795 334 illustrations 24 colour plates London Bailliere Tindall and Cassell Ltd Price 70s

The previous editions of this book have been noted for the clear and authoritative presentation of the material and the thirteenth edition is no exception The expansion of the section on ophthalmic optics has increased the scope of the book to include the embryo ophthalmologist

There is considerable bias to ophthalmic medicine which is in keeping with the present extension of the frontiers of the ophthalmologist beyond the orbital walls

The book is generously illustrated throughout although Plate XXIII is spoiled by the obscure ill markers, some errors perpetuated from the last edition There are a number of spelling errors but it is pleasing to see the use of the adjective 'accommodative' instead of the more usual unsatisfactory form more suited to the ENT text book There are also a few factual errors The focal lengths of X8 and X10 loupes are not as stated and the rationale of the methylene blue dye test in the diagnosis of toxoplasmosis is not in accordance with the description of Sabin and Feldman

However considering the high standard of printing and illustration the cost of the book is modest and it should be an asset to any teaching library A J R

ANTIBIOTIC AND CHEMOTHERAPY By Lawrence F Garrod MD(Camb) HonLLD(Glasgow) FRCP and Francis O Grady MD(Lond) MSc(Lond) MCPath Second edition Pp xxvi + 475 Illustrated Edinburgh and London F & S Livingstone Ltd Price £2 10s 0d + 4s 6d postage

This book reviews in the first part all the agents of value in antibiotic and chemotherapy from their evolution and in the second part advises on their use in rational therapy

The first part is easily readable but is also carefully arranged for use as a book of reference for the many medical men who are somewhat lost in the multitude of pharmaceutical preparations. It ends with a chapter on the ways in which abnormal resistance in antibiotics may arise and under Ephemeral Transference, by conjugation (pharmacial resistance) the very severe dangers to man from this phenomenon are explained. The chapter put by limited investigations on the excessive use of antibiotics in livestock rearing is mentioned with the horrifying possibility that the treatment of typhoid fever may be reduced to diet and nursing.

Part two is concerned with treatment in clinics. Not one of the drugs with which this book is concerned can be administered without some risk of ill effects. It describes the general principles of therapy and then discusses treatment by systems and their likely infections. The layout here is also designed for ease in use as a work of reference. The subject of non-absorbable Chemotherapy of virus diseases and bacteriophages is useful article on Methisazone and its value in conjunction with vaccination of patients at special risk. The last chapter is devoted to laboratory control and in less than 30 pages describes brilliantly all the usual methods including their pitfalls and how these can be avoided. The photographs are particularly delightful and well reproduced.

The great value of this book to the medical profession has already been established by the sell out of the first edition and need for this early second edition. It is heartening that this price has been kept down in a sum which will allow this work to be read as widely as it deserves.

PSF

SEX AND ITS PROBLEMS. Edited by W. A. R. Thomson. pp. 90. Edinburgh and London: E. & S. Livingstone Ltd. Penn 15/- + 10d. postage.

An inexpensive brief but comprehensive account of both the physical and psychological aspects of sexual life. The sections on the physical aspects including endocrinological and noncentral disorders and infertility are clear and factual. They are readily understood by the non-specialist.

Of necessity the sections dealing with the psychological problems are less concise as it is difficult to convey in print the complexity of individual behaviour and the origins of their difficulties. However the description of the wide variations in sexual behaviour are necessary and will enable the physician to discuss such behaviour realistically with his patient. Such informed discussion with patients frequently enables them to see their difficulties in a more objective way and so prepare the way for realistic solutions to their problems.

This book can be recommended to all those physicians who are expected to give advice on sexual problems. The reviewer has found it most useful already.

DHM

FRACTURES OF THE FACIAL SKELETON. By N. L. Rowe FDS. RCS(Eng) FDS. RCS(Edin) HDD. LRCP. MRCS. LMSSA. and H. C. Killey FDS. RCS(Eng) FDS. RCS(Edin) HDD. LRCP. MRCS. LMSSA. Foreword by Sir Reginald Watson-Jones. BSc. MCh(Orth). FRCS. FRACS. FACS. Second edition. Pp. xvii + 896. Illustrations 1,506 with 21 in colour. Edinburgh and London: E. & S. Livingstone Ltd. Price £11 + 6s. postage.

It is now 13 years since I had the privilege of reviewing the first edition of this book for the Journal. Since then the book has already entered the category of being a 'Classic' and is used universally by maxillofacial registrar and student of oral surgery. In the second edition Rowe and Killey have successfully managed to gild the lily. New sections have been included and the text carefully reviewed. There are many examples of unhelpful repetitioning of items in a volume more appropriate for easy reading, for example the remodelling of the section entitled 'The Classification of Cau Splints' from chapter 7 to the more appropriate chapter 30 on Maxillo-Facial technology. The rewriting of the chapter on injuries to the temporo-mandibular joint and mandibular condylar and on the zygomatico-maxillary complex gives the reader a clear and comprehensive view of the possible injuries with a good classification and list of signs and symptoms. Probably in this edition as in maxillo-facial surgery over the last 12 years surgery on the zygomatico-maxillary complex has changed most. The external importance of the preservation of the nerve is emphasised and once again in chapter 15 entitled 'The Preliminary Care and General Principles of Treatment of Fractures of the Middle Third'.

New operative techniques which have been described include Obwegeser's method of transfacial wiring of the mandible which is a valuable modification of an old technique. The authors have been well served by their chosen contributors in particular Professor C. R. H. Kramer's chapter on the structure of bone and the processes of repair which is told not in his usual matter-of-fact style. The medical aspects by Brigadier D. V. Taylor discuss the way in which the maxillo-facial surgeons can expound in these days of hygiene consciousness seekers and emphasises the importance of records and history taking. The use of the Maxillo-Facial Injuries Admission Form shown in the Appendix should be almost mandatory, at least morally obligatory. Finally Mr. Conroy's chapter on Maxillo-Facial Technology is the most comprehensively written and illustrated exposition which has been produced.

Extreme care has been taken throughout this edition to review the careless phraseology of day to-day use for the sake of clarity. 'Transcostectomy' in lieu of 'intercostectomy' and 'Arch Bar Wiring' instead of 'Arch Wiring' are examples of neologisms to which we must give approval. I am not so sure that the pedantry of 'Lachrymal' in place of the more common medical usage of 'Lacrimal' is desirable but I am not supported by the Lexicographers.

There are a few minor criticisms. It is still felt that the chapter on Anaesthesia is a weak link not because of its quality but rather because it is considered that this chapter alone is not sufficient to satisfy the anaesthetist who is faced with Maxillo Facial Injuries. Equally too much is stated merely to enable the surgeon to assess the anaesthetic difficulties. The chapter seems to have fallen between the stools of too little and too much. It is noted that Figure 15.12 is incorrectly labelled. Surely it should read 'tips of the scissors passed under the thyroid isthmus'.

There is no doubt that this book will remain the definitive text book on the subject of Maxillo Facial Injuries for many years. It is recommended with reservation for use by consultants, trainees and students.

D.L.G.

News of the Service

OBITUARIES

Surgeon Captain Samuel BRADBURY MB 5Ch DPH DMRE died at Tunnliffn on 9th Jnnn 1968. Hn was born in County Antrim on 12th Jnnc 1882 nnd nftnr qualifying as MB 5Ch at Queen's College Belfast he joined the Royal Navy as Surgeon in 1908. Hn served in the battleships *Queen* and *Zealandia* until 1913. Later in that year he went to RN Hospital Plymouth as Anaesthetist and Radiologist.

In 1915 he joined HMS *General Wolf* transferring to HMS *Amethyst* in 1917.

After the war in 1919 he returned to RN Hospital Plymouth as Anaesthetist, and at this time obtained his DPH. He served in HMS *Cape Town* from 1922 to 1924 and after this he went to Chatham as Naval Health Officer the specialty to which he devoted most of his career. He joined HMS *Dunedin* in 1927 as Squadron Medical Officer of the New Zealand Squadron of the Royal Navy.

He returned to Chatham as NHO in 1930 and was promoted Surgeon Captain in 1931. He went to RN College, Greenwich in 1932 as Professor of Hygiene and Director of Medical Studies and was transferred to Portsmouth in 1935 as NHO. He was placed on the Retired List for age in June 1939.

In August 1939 he was recalled and took over SS *Aba* which underwent a hasty conversion on passage to Scapa Flow where it became of great value to the Fleet as a hospital ship. In 1941 he went to Plymouth as NHO and remained there till 1946 when he revnited to the Retired List.

Sam Bradbury will be remembered with affection and esteem by older members of the Medical Service of the Royal Navy. He was a large man who was shrewd and kindly and made a definite impact on the health of the sailor in his work as Naval Health Officer and at the Royal Naval Medical School. He was of mature, a brother of the late Surgeon Rear Admiral William Bradbury CBE DSO and an uncle of Surgeon Rear Admiral Eric Bradbury CB QHP. He married after his retirement, and went in live by the sea in County Donegal where he was able to follow his favourite pursuits fishing and shooting. A few years ago he and his wife moved to warmer surroundings at Tunnliffn.

We extend our sympathy to Mrs Bradbury on her loss.

Written by SKA R N MUSSEN CB CBE MD FRCP

Surgeon Captain Charles Patrick COLLINS, DSC, MD DPH RN (Rtd) died suddenly on 18th September 1968 at the age of 61. He was born on 18th March 1907.

He entered the Royal Navy as a Surgeon Lieutenant on 7th December 1933 was promoted to Surgeon Lieutenant Commander on 7th December 1938 to Surgeon Commander on 7th December 1944 and to Surgeon Captain on 30th June 1957. He was placed on the Retired List in March 1964.

Surgeon Captain Collins was awarded the DSC in December 1944 for Devotion to duty during action off the coast of Normandy. He obtained the Parkes Memorial Prize in 1956 and the Gilbert Blane Medal in 1960.

Surgeon Captain (D) John Ramsey PALMER OBE, LDS RN (Rtd) died on 20th September 1968 at the age of 83.

He entered the Royal Navy as a Surgeon Lieutenant (D) on 5th August 1914 being promoted Surgeon Lieutenant Commander (D) on 5th August 1920 and Surgeon Commander (D) on 1st July 1926. He was placed on the Retired List at his own request on 19th April 1935 in the rank of Surgeon Captain (D). Also recall for service in the Second World War in 1939 he finally reverted to the Retired List in 1942.

Surgeon Captain (D) John Edmund DANIELS VRD LDS U Division RNVR died on 9th July 1968 at the age of 64.

Born at Newcastle upon Tyne on 19th August 1903 and educated at Ackworth School he qualified LDS from the University of Durham in 1925. After qualifying he joined his father in practice and was for many years an Honorary Dental Surgeon at the Newcastle Dental Hospital.

Commissioned as a Surgeon Lieutenant (D) in 1927 he was attached to the Type Division of the Royal Naval Volunteer Reserve and served in HMS *Calliope*. He was mobilised at the outbreak of the Second World War and was soon serving afloat in HMS *King George V* and later with much distinction in HMS *Nelson* with Force H and the Malta convoys. Towards the end of the war he was in charge of dental facilities in HMS *Golden Hind* when it became the Base for the British Pacific Fleet in Australia.

He had the distinction of becoming the first Surgeon Captain (D) in the RNVR and continued to serve in the Tyne Division after the war until his retirement in October 1955. During this time, he returned to the staff of the hospital where, in 1948 he was appointed as a part-time consultant and clinical teacher. In this capacity his inspiration and devotion to the Senior Service did much to encourage many young men starting their career to seek a commission in the Royal Naval Dental Service.

Eddie was an active member of many dental societies and organisations including the Royal Naval Medical Club and his attendance at annual dinners at Greenwich was always most welcome. He was a keen golfer and a skilful fly-fisherman and will be sadly missed by those who were privileged to accompany him on these occasions.

To Beth, his devoted wife, and two daughters both of whom married in the Service, we extend our deepest sympathy. W.L.M.

Surgeon Commander (D) Arthur William WALLACE LDS, RN (Retd) died on 4th July 1968 at the age of 68.

He entered the Royal Navy as a Surgeon Lieutenant (D) on 21st July 1923 being promoted Surgeon Lieutenant-Commander (D) on 21st July, 1929 and to Surgeon Commander (D) on 28th November 1940. He was released from the Service on 1st December, 1949.

QUEEN'S HONORARY SURGEON

Surgeon Captain J. W. Walker OBE

HIGHER QUALIFICATIONS

Surgeon Commander E. E. Sims — MRCP(Edin)
Surgeon Commander J. H. Sewart — DIH
Surgeon Commander J. F. Ryan — DAvMed
Surgeon Lieutenant Commander J. W. Davies — DAvMed
Surgeon Lieutenant Commander N. L. Denham — FFARCS(Eng)

HALLETT PRIZE

Surgeon Lieutenant G. F. Coombes has obtained the Hallett Prize which is awarded to the best candidate for Primary Examination for Fellowship of the Royal College of Surgeons of England.

PROMOTIONS

To *Surgeon Vice Admiral* on 14.7.69 — E. B. Bradbury CB QHP MB BCh BAO DMRD

To *Surgeon Lieutenant-Commander* — M. S. Kerrigey MB ChB, P. J. B. Smith MB ChB

To *Surgeon Lieutenant Commander (D)* — J. M. Burrow LDS, N. R. Attenborough BDS, D. R. A. Lloyd Edwards BDS LDS RCS, R. J. Biggs BDS, P. G. Edwards LDS, R. Halland MB ChB, DObstRCOG

To *Surgeon Lieutenant* — R. G. Bullock MB BS, T. J. McCann, MB ChB, T. L. Moody MB BS, D. J. Hardy MB ChB, Q. I. McQuoosey MB ChB, L. E. Ramsey MB ChB, M. MacLeod MB ChB, T. H. D. Smyth MB BCh, C. W. Evans MRCS LRCP, D. W. K. Gibson MB ChB, P. T. Bull MB ChB, C. Bunting, MB ChB.

Provisional selection for promotion to date 31st December, 1968

To *Surgeon Captain* — J. M. Cliff MA MB BCh FRCP F. A. F. Mackenzie, MB, ChB DMRD FFR, T. C. Harris FRCS MB ChB DO

To *Surgeon Commander* — R. J. Vaughan MA MB BCh, R. J. Carmichael MB BS, A. J. Kinnaid MB ChB DO FRCS(Eng)(OPH), M. G. Williams MB, BCh MRCS, LRCP DO, J. M. Young, MRCS LRCP, E. P. Buck MB ChB

To *Surgeon Commander (D)* — G. D. Sharpe BDS, FDS RCS(Eng)

NEW ENTRIES

Surgeon Sub Lieutenants — R. J. Rhodes, R. G. Thomson, J. D. Fleming, P. F. Harvey, R. J. Leicester

Surgeon Sub Lieutenants (D) — S. K. Day, K. G. Powell, G. L. Wickens

TRANSFER TO 16-YEAR PENSIONABLE COMMISSION

Surgeon Lieutenant Commander J. A. Thom MB ChB DTM&H, M. J. Harley MB BS MRCS LRCP DObstRCOG

RETIREMENTS

Surgeon Captain J. K. Salmon, MRCS LRCP, J. A. N. Lock MB BCh MRCS, LRCP DOMS, F. H. Lamb QHS MRCS LRCP

TERMINATION OF COMMISSIONS — RELEASES

Surgeon Commander C W J Ussher, MRCS MRCP(Ed)
Surgeon Lieutenant Commanders K W Joshua MB ChB A M Ashley MB ChB DObstRCOG J B O'Meara MB BS D J McKay LM LS A J Reed, MB BS M M McLoughlin LRCS LRCP, DA
Surgeon Lieutenant Commander (D) D R James BDS FDS, RCS, N J Stimson LDS
Surgeon Lieutenants J R Glenno, MB ChB W M Abbott MD ChB J R Russell MA MS BCh DObstRCOG D W R Wagener BA MB BCh BAO
Surgeon Lieutenant (D) J A M Smallridge, BDS J A M Reed BDS, A J Rugg-Gunn BDS LDS RCS
Actg Surg Lieutenant M J M Barker MB BS.

WARDMASTERS

Higher Qualifications

Wardmaster Sub Lieutenants D Swiffen and P Gregory have obtained the Post Graduate Diploma in Principles of Radiation Safety Practice of the University of Surrey

Promotions

To *Wardmaster Lieutenant Commander* T R Clarkson
To *Wardmaster Lieutenant* J Lyons S G Gerry M L W Peryer

Retirements

Wardmaster Commander J C McKenzie BEM
Wardmaster Lieutenant Commander O A Saunders MBE
Wardmaster Lieutenant N Sunson
Wardmaster Sub Lieutenant N L Wheeler

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

New Entries

Nursing Sister P M Smith L Butters J Massey S H Prior A I Hoyle P Q Harris M P Eaves P P Cairns P A Ainsworth V Elliott V J White R M Wilson

Retirement

Miss V Davidson Superintending Sister

ROYAL NAVAL RESERVE

Promotions

To *Surgeon Commander* D G L Davies RD W M Mackean RD
To *Surgeon Lieutenant-Commander* D W Bulluss J Mowat D W Davison, TD
To *Surgeon Lieutenant Commander (D)* C MacRae BDS

Retirements

Surgeon Captain W E A Fuehman VRD MB ChB
Surgeon Commander J R Briggs VRD MRCS LRCP MB BS
Surgeon Lieutenant Commander R A J Baily RD MB BCh FRCS LRCP P J F Woodroof VRD M M Brown RD BA MB BCh FRCS A I MacPhail MB ChB

ERRATUM

Page 147 Vol 54 No 2

The second sentence top of page should read In almost one quarter of routine autopsies when carefully examined asbestos bodies *could be found* in the *lung all cases with pleural plaques showed them* Although asbestos bodies were demonstrated in only 23 out of 25 cases of mesothelioma, in the remaining two the specimens available were less than 30μ in thickness and thus unreliable for this purpose

Index

AUTHORS

ARTICLES AND CLINICAL NOTES AND LAWS